DOCUMENT RESUME

ED 462 274 SE 065 390

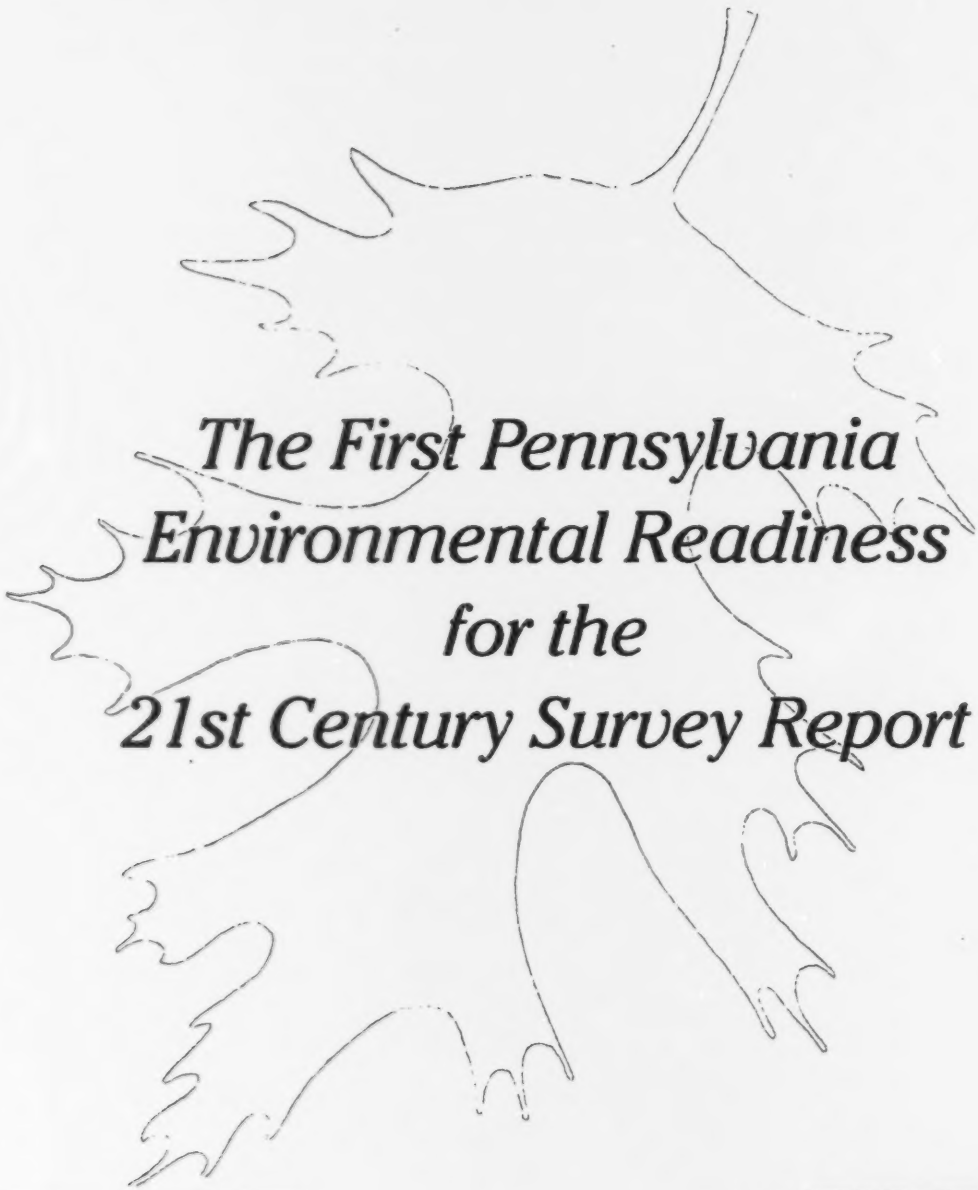
AUTHOR	Johnson, Paulette; Smith-Sebasto, Nicholas J.
TITLE	The First Pennsylvania Environmental Readiness for the 21st Century Survey Report: Survey of Adult Pennsylvanians' Knowledge about, Attitudes toward and Behaviors Related to the Environment.
INSTITUTION	Pennsylvania Center for Environmental Education, Slippery Rock.; Roper Starch Worldwide Inc.
SPONS AGENCY	Pennsylvania Business Roundtable, Harrisburg.; National Environmental Education and Training Foundation, Washington, DC.
PUB DATE	2000-00-00
NOTE	52p.; Also funded by the Pennsylvania Department of Environmental Protection.
AVAILABLE FROM	Pennsylvania Center for Environmental Education, Slippery Rock University, Slippery Rock, PA 16057 ($5). For full text: http://www.pcee.org.
PUB TYPE	Reports - Descriptive (141)
EDRS PRICE	MF01/PC03 Plus Postage.
DESCRIPTORS	*Adults; *Attitudes; Conservation Education; Economics; *Environment; *Environmental Influences; Public Health; Scientific Literacy; Surveys
IDENTIFIERS	Pennsylvania

ABSTRACT

This report presents the results of the First Pennsylvania Environmental Readiness for the 21st Century which investigates the attitudes, knowledge, and behaviors of Pennsylvanian adults towards the environment. The survey questions were divided into four categories: (1) environmental literacy; (2) environmental attitudes; (3) environmental behaviors; and (4) environmental education. Contents include: (1) "Introduction"; (2) "The Essence of Environmental Education"; (3) "Pennsylvania's Environmental Literacy"; (4) "Pennsylvania's Environmental Behaviors"; (5) "Pennsylvania's Environmental Attitudes"; (6) "Environmental Education and Pennsylvania Schools"; (7) "Conclusions"; and (8) "Recommendations." Appendices include the questions, methodology, and regions used in the report. (YDS)

Reproductions supplied by EDRS are the best that can be made
from the original document.

ED 462 274



The First Pennsylvania Environmental Readiness for the 21st Century Survey Report

PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL HAS BEEN GRANTED BY
P. Johnsen
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
1

BEST COPY AVAILABLE

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
☒ This document has been reproduced as received from the person or organization originating it.
☐ Minor changes have been made to improve reproduction quality.
• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

SP035390

SURVEY OF ADULT PENNSYLVANIANS' KNOWLEDGE ABOUT, ATTITUDES TOWARD AND BEHAVIORS RELATED TO THE ENVIRONMENT

Report and Survey Facilitated by the Pennsylvania Center for Environmental Education

Pennsylvania Center for Environmental Education

Pennsylvania Center for Environmental Education Partners

Pa. Alliance for Environmental Education
Pa. Association of Conservation Districts, Inc.
Pa. Department of Agriculture
Pa. Department of Community and Economic Development
Pa. Department of Conservation and Natural Resources
Pa. Department of Education
Pa. Department of Environmental Protection
Pa. Department of Health
Pa. Fish and Boat Commission
Pa. Game Commission
Pa. State System of Higher Education
Pa. Wild Resource Conservation Fund

Primary Investigators

Dr. Paulette Johnson
Associate Professor
Slippery Rock University

Slippery Rock University

Dr. Nicholas J. Smith-Sebasto
Assistant Professor - Chair of the
North American Association
For Environmental Education
Research Commission

NAAEE
North American Association for Environmental Education

Survey Work Group

Robert Barkanic, Deputy Secretary, Department of Environmental Protection
Michelle Harvey, National Environmental Education and Training Foundation
Michael McCarthy, Pennsylvania Business Round Table
Helen Olena, Department of Environmental Protection
Carl Richardson, Pennsylvania Fish and Boat Commission

Survey Conducted By

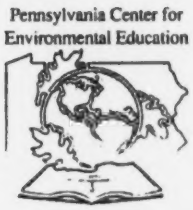
Roper Starch Worldwide

Funded By

Pennsylvania Department of Environmental Protection

Pennsylvania Business Roundatbale

NEETF
The National Environmental Education & Training Foundation



About The Pennsylvania Center For Environmental Education

The Pennsylvania Center for Environmental Education (PCEE) is a cooperative partnership among 12 Pennsylvania entities formed to maximize statewide environmental education (EE) resources and efforts and to ensure that all citizens of the Commonwealth continue to have access to quality environmental education. The PCEE's services are available to all citizens of the Commonwealth including schools, environmental and environmental education organizations, business and industry, community and civic groups and others.

The Center's Mission

The Pennsylvania Center for Environmental Education will promote the environmental education process as a tool through: collaborating with the partners; providing access to quality resources and services; identifying needs and trends; enhancing and complementing the effectiveness of existing programs, and the facilitating of partnerships.

The Center's Goals

- Disseminate environmental education information and materials
- Facilitate partnerships for the purpose of providing environmental education
- Assist in professional development in environmental education

The Center's Initiatives

- Information Dissemination
  - connecting people with the network of available environmental education resources and information.
- Professional Development
  - assessing needs and serving as a resource for professional development opportunities in EE.
- Business and Industry
  - facilitating working partnerships with schools and communities and providing for internal EE awareness and training in business.
- Higher Education
  - integrating environmental education into college and university programs.

For more information on the PCEE visit our website at www.pcee.org.

Acknowledgements

This project involved many individuals in the Pennsylvania Center for Environmental Education partnership, as well as numerous external reviewers and consultants.

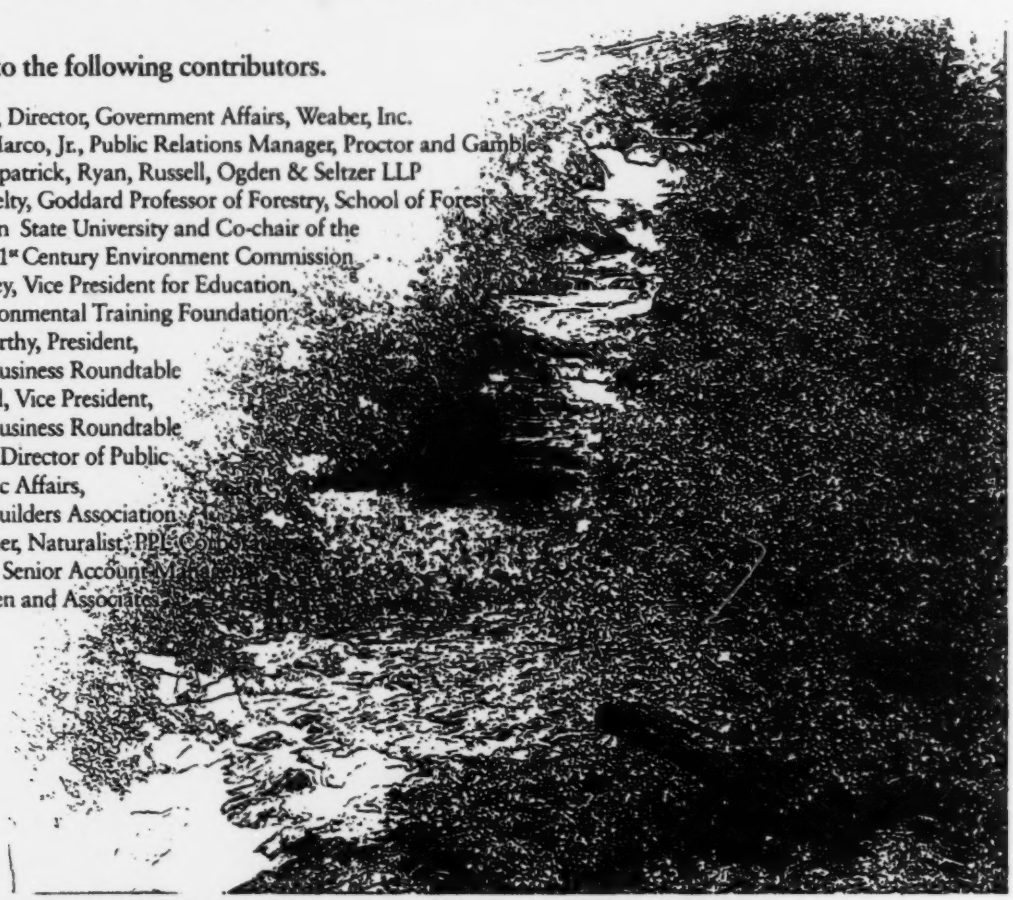
Thanks to the following Pennsylvania Center for Environmental Education Partners:

- Theresa Alberici, Project Wild Coordinator, Pennsylvania Game Commission
- Robert Barkanic, Deputy Secretary for the Office of Pollution Prevention and Compliance Assistance, Department of Environmental Protection
- Denise Dumouchel, Assistant Professor and Project Facilitator, Slippery Rock University
- Frank Felbaum, Executive Director, Wild Resource Conservation Fund
- Jason Ginder, Student Assistant, Pennsylvania Center for Environmental Education, Slippery Rock University

- Jerry Hassinger, Wildlife Diversity Biologist, Pennsylvania Game Commission
- David E. Hess, Executive Deputy Secretary of Policy and Communication, Department of Environmental Protection
- Sarah Hopkins, Division Chief, Environmental Education and Information, Department of Conservation and Natural Resources
- James Logue, Dr. P.H., Director, Division of Environmental Health Assessment, Pennsylvania Department of Health
- Georgia Masters, Policy Specialist, Department of Community and Economic Development
- Helen Olena, Director of Environmental Education, Department of Environmental Protection
- Carl Richardson, Aquatic Resource Education Project Manager, Pennsylvania Fish and Boat Commission
- Mary Richardson, Graduate Assistant, Pennsylvania Center for Environmental Education, Slippery Rock University
- Laurie Rosenberg, Staff Project Manager, Pennsylvania Center for Environmental Education
- W.G. Sayre, Ph.D., Professor of Chemistry, Slippery Rock University
- Richard Souza, Project Manager, Pennsylvania Center for Environmental Education
- Lisa Theodorson, Secretary, Pennsylvania Center for Environmental Education
- Patricia Vathis, Environment and Ecology Curriculum Advisor, Pennsylvania Department of Education

Special thanks to the following contributors.

- Thomas Buzby, Director, Government Affairs, Weaber, Inc.
- Joseph G. DeMarco, Jr., Public Relations Manager, Proctor and Gamble
- Terrance J. Fitzpatrick, Ryan, Russell, Ogden & Seltzer LLP
- Caren E. Glotfelty, Goddard Professor of Forestry, School of Forest Resources, Penn State University and Co-chair of the Pennsylvania 21st Century Environment Commission
- Michelle Harvey, Vice President for Education, National Environmental Training Foundation
- Michael McCarthy, President, Pennsylvania Business Roundtable
- Megan Milford, Vice President, Pennsylvania Business Roundtable
- Debra Tingley, Director of Public Relations/Public Affairs, Pennsylvania Builders Association
- Margaret Welker, Naturalist, PPL Co[illegible]
- Patricia Wood, Senior Account M[illegible], William J. Green and Associates



FOREWORD

Few Pennsylvania challenges of the new century will be greater than those addressing the education of our citizenry, the protection of our environment and the maintenance of a strong economy. As activities of the last century fade into memories and the new millenium dawns, it seems an appropriate time to begin to measure collectively the environmental knowledge of our citizens, and their attitudes and behaviors toward the environment, and to utilize this information to aid in our pursuit of a sustainable environment and economy. To date, this has not been accomplished.

The First Pennsylvania Environmental Readiness for the 21st Century Survey Report is particularly timely for Pennsylvanians. Governor Tom Ridge commissioned a statewide report on environmental priorities for the 21st Century. Additionally, environment and ecology standards are pending for our schools. These standards will impact what is taught to our children and how teachers are prepared to address the needs of our young citizens.

Environmental and economic concerns have been and will continue to increase in complexity. It is vital that we enter this century with the understanding that the environment and economy can go hand-in-hand. A healthy environment ultimately will support a healthy economy.

The last century relied heavily on laws and regulations to achieve environmental compliance. In this new era, a greater array of tools will need to be applied as we strive both to maintain a thriving economy and to secure environmental stewardship. Environmental education will be an important tool in the years ahead - a tool that needs to be available in our basic and higher education systems, as well as to Pennsylvania's adult population.

As is true of questionnaires, this survey reports good news as well as concerns that need to be addressed. It is important that this report be put in perspective, particularly the environmental literacy section. This section is not an assessment of environmental education accomplishments, but rather the beginning of baseline data collection. Assessment implies measurement of success. Measurement of success is used when there is a project to measure. No agency or organization in the state has embarked on an environmental literacy project.

Pennsylvanians may take pride in many of the results found in this survey. Most important are the citizens' positive attitudes toward the environment, their willingness to take personal responsibility for solving environmental problems, and their desire for balance between economic and environmental health.

James M. Seif
Secretary
Pennsylvania Department
of Environmental Protection

Eugene W. Hickok, Jr.
Secretary
Pennsylvania Department
of Education

James H. McCormick
Chancellor
Pennsylvania State
System of Higher Education

Michael T. McCarthy
President
Pennsylvania
Business Roundtable

TABLE OF CONTENTS

1 EXECUTIVE SUMMARY

5 INTRODUCTION

6 THE ESSENCE OF ENVIRONMENTAL EDUCATION

8 PENNSYLVANIA'S ENVIRONMENTAL LITERACY

- 8 Fact-based Environmental Knowledge
- 10 How's Your Environmental Knowledge?
- 10 Environmental Literacy Test and What It Means to Pennsylvanians
- 14 Knowledge About Environmental Issues
- 14 Statewide Perspective of Environmental Issues

15 PENNSYLVANIA'S ENVIRONMENTAL BEHAVIORS

- 15 Causes of Pennsylvania's Environmental Problems
- 15 Solving Pennsylvania's Environmental Problems
- 16 Day-to-Day Environmental Behaviors

17 PENNSYLVANIA'S ENVIRONMENTAL ATTITUDES

- 17 Economics and the Environment
- 18 Public Attitude Toward Environmental Protection
- 18 Pennsylvanians' Attitudes Toward Property Rights
- 19 Linking Environmental and Human Health
- 19 Attitudes Toward Sustainable Development
- 20 Farmland Preservation
- 20 Choosing a Place to Live
- 21 Recycling Collection Goal
- 21 Waste Reduction

22 ENVIRONMENTAL EDUCATION AND PENNSYLVANIA SCHOOLS

23 CONCLUSIONS

- 23 Responsible Land Use
- 25 Conservation of Natural Resources for Sustainable Use
- 26 A Healthy Environment for Healthy People
- 29 Developing a New Foundation for Teamwork
- 30 Promoting Environmental Education, Training and Stewardship

33 RECOMMENDATIONS

34 APPENDICES

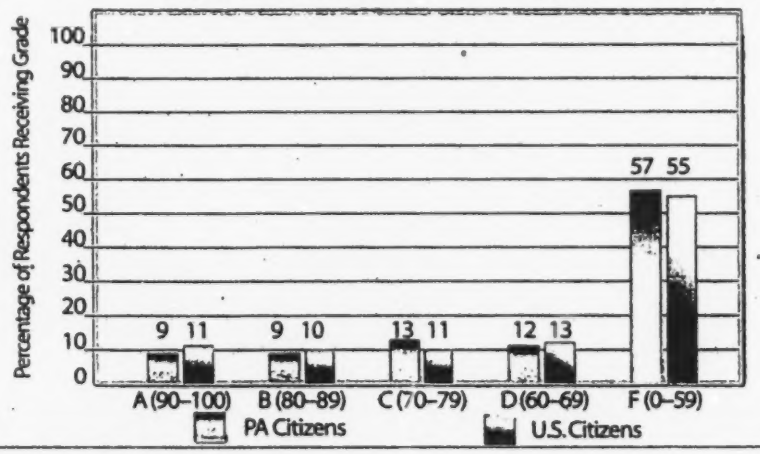
- 34 Appendix 1: The First Pennsylvania Environmental Readiness for the 21st Century Questions
- 41 Appendix 2: Methodology
- 42 Appendix 3. Pennsylvania by Regions

EXECUTIVE SUMMARY

The Commonwealth recently completed its first Environmental Readiness for the 21st Century Report. The report is a survey of adult Pennsylvanians' knowledge about, attitudes toward and behaviors related to the environment. It addresses the environmental literacy recommendations in the *Report of the Pennsylvania Century Environment Commission*. Additionally, it makes numerous comparisons between Pennsylvania citizens and United States citizens as a whole, and begins to probe some of the public's environmental attitudes and behaviors. See Figure 1. *The Pennsylvania Environmental Readiness for the 21st Century Survey Report* is the first of its kind in the nation. A copy of the entire survey report may be found on the Pennsylvania Center for Environmental Education website (www.pcee.org).

The survey consisted of a series of questions posed to a random sample of 1,000 adult Pennsylvanians by telephone and was conducted by Roper Starch Worldwide, Inc. The survey instrument was developed from the 1997 National Environmental Education Report Card and then adapted to meet Pennsylvania's specific needs.

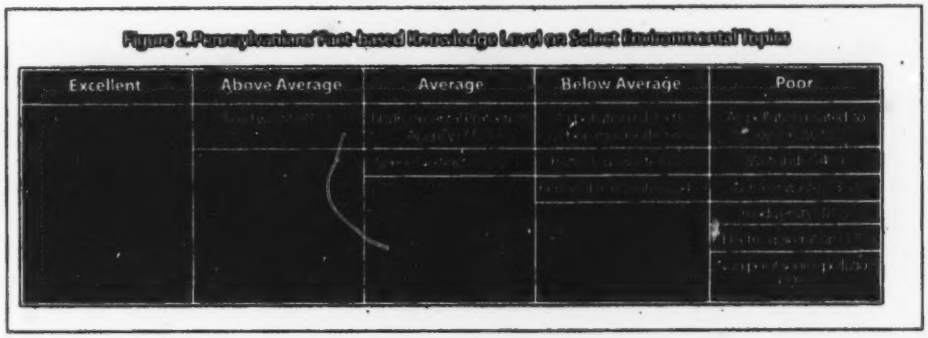
Figure 1: Pennsylvania Respondents' & National Study Respondents' Scores on the Test of Environmental Literacy



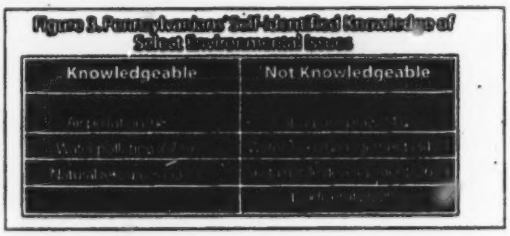
As you read the findings and conclusions, it is important to keep things in perspective. Foremost, this is not an evaluation, but a collection of baseline data. No one agency or organization in Pennsylvania has or could take on the responsibility of environmental stewardship for all Pennsylvanians. It is far too large and complex a task. Additionally, the literacy component of this survey provides only a sampling of the many aspects of environmental literacy. Last, as with most reports, weaknesses and strengths are identified. While it is important to address shortcomings, there were many positive results within this study. As we work toward an environmental stewardship goal, we need to remember to celebrate Pennsylvania's many environmental education successes.

Findings and Conclusions

- **While Pennsylvanians personally take primary responsibility for solving the state's environmental problems and have positive attitudes toward the environment, they, like the nation as a whole, currently have a poor grasp of both environmental knowledge and environmental issues. Lack of basic environmental knowledge by Commonwealth citizens will inhibit progress in environmental stewardship.** Of the 11 environmental subjects addressed in the environmental fact-based knowledge section, Pennsylvanians have above average knowledge about solid waste and average knowledge as to the role of the U.S. Environmental Protection Agency (EPA) and why species become extinct. Commonwealth citizens have surprisingly little knowledge about non-point source pollution, electricity generation and the term biodiversity. See Figure 2.

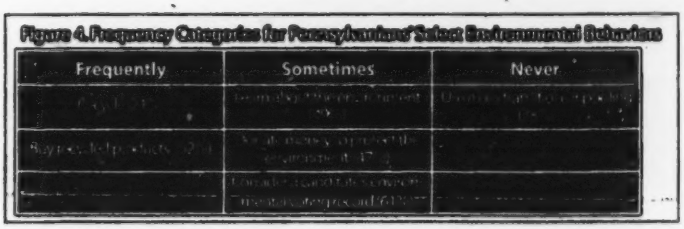


- Pennsylvanians only feel knowledgeable about some of Pennsylvania's major environmental issues. See Figure 3.



- **The public does not have the causes of pollution in perspective for Pennsylvania.** Nearly three out of every four respondents (73 percent) still see factories and point source pollution as the primary cause of environmental degradation of the state's air and water. Contemporary non-point polluters, such as acid mine drainage, agricultural activities and the collective effects of individual behaviors, are now Pennsylvania's major contributors to water pollution. Yet the public does not see themselves or agriculture as major contributors to the pollution problem. The public needs to be more involved in the entire environmental education process related to air and water issues in Pennsylvania. This lack of knowledge and perspective could interfere with non-point source pollution prevention and other cleanup initiatives.

- **Pennsylvania citizens see themselves as having the primary role in solving the Commonwealth's environmental problems.** An enlightening finding in this study is that while Pennsylvanians do not necessarily see themselves as major contributors to pollution, they are willing to take personal responsibility to solve environmental problems.



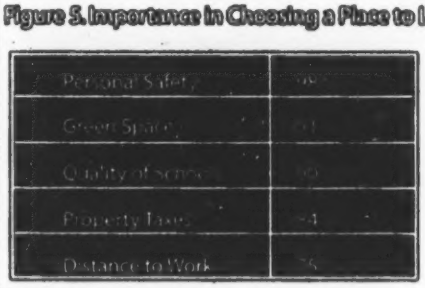
- **Pennsylvanians' participation in sustainable environmental behaviors varies greatly.** Six day-to-day environmental behaviors were surveyed: 1) recycling; 2) buying recycled products; 3) learning about the environment, 4) considering a candidate's environmental voting record, 5) donating money to protect the environment, and 6) using mass transit or car-pooling. See Figure 4.

- **Pennsylvanians have positive attitudes toward the environment and the economy.** While favoring the environment over the economy by a two to one margin, the majority (64 percent) of Pennsylvanians believe that protecting Pennsylvania's environment and economic development can go hand-in-hand. Additionally, they most often responded (44 percent) that environmental laws and regulations have "not gone far enough."

- **Pennsylvanians need to invest in the entire environmental education process (awareness, knowledge, attitudes, skills and participation) in order to benefit from the contribution environmental education can make toward the solving of land use issues for the Commonwealth.** Pennsylvanians have a positive attitude toward solving the state's land use dilemma, in that they want a balanced approach between environmental protection, property rights and preserving farmland. However, the Commonwealth's adult public's knowledge base and surveyed sustainable environmental behaviors toward land use solutions are not always present.

  The public needs more information on suburban sprawl, watershed management, sustainable development, biodiversity and wetlands. Additionally, they do not appear to be considering implications of transportation in land use issues. Transportation is not among their most important considerations when choosing a place to live and the majority of citizens are not using mass transit or car pooling. See Figure 5. Respondents indicated that part of the reason they are not using mass transit or car-pooling is associated with where they live and the transportation options that are available to them.

Figure 5. Importance in Choosing a Place to Live



- **Pennsylvanians are performing environmentally responsible behaviors related to solid waste reduction and are participating in the entire environmental education process related to recycling. They also are willing to strive for a 10 percentage point increase in recycling efforts.** A highlight of this study is the comprehensive information collected on recycling in Pennsylvania. The public has some basic knowledge about solid waste, has positive attitudes toward recycling, is regularly participating in recycling programs and is willing to voluntarily increase its recycling efforts. However, three out of every four Pennsylvanians (77 percent) cannot visualize a zero waste stream in the 21st Century.

  Pennsylvanian's environmental stewardship, related to recycling, is likely a product of the implemented regulation/education model set forth in Act 101 (Recycling Act). Unfortunately, the contribution of education to environmental stewardship for recycling is not documented; nor is there any other implemented regulation/education model in Pennsylvania to which these findings may be compared.

- **There needs to be a continuation of an organized and cooperative approach to environmental literacy/stewardship for Pennsylvania citizens.** A public that does not have a grasp of environmental knowledge and issues cannot effectively and efficiently participate in the higher order thinking skills that are required to solve Pennsylvania's environmental problems. No single agency or organization can or should be responsible for securing an environmentally literate and sustainable active populace for Pennsylvania.

- **By an overwhelming majority (96 percent), Pennsylvanians want environmental education taught in schools. A little more than half (59 percent) know if their community schools currently include environmental education in their curriculum.**

BEST COPY AVAILABLE

- Adult environmental learning in Pennsylvania is sporadic and limited. When the public was asked if they try to learn about the environment or environmental issues, the most common response was "sometimes." The environmental literacy fact-based questions and the self-reporting of environmental issues knowledge questions verify the need to increase the availability of the environmental education process to Pennsylvania's adults. Educational efforts are particularly needed for the following topics: 1) transportation (as it relates to suburban sprawl and environmental health); 2) suburban sprawl; 3) non-point source pollution; 4) biodiversity; 5) energy; 6) watershed management; 7) sustainable development; and 8) agriculture.

Recommendations

Long Term Recommendation:

Pennsylvania's agencies, organizations, businesses and industries must continue to work collectively to increase the quality and quantity of environmental education in Pennsylvania, striving toward environmental literacy and ultimately toward environmental stewardship. The environmental education process must be applied in its entirety, and in a goal-driven and systematic method.

Short Term Recommendation:

A stakeholders' group should be convened to suggest avenues to further strengthen the environmental education process, based on the findings of this report. The Pennsylvania Center for Environmental Education will be responsible for identifying a convener for the stakeholders group, determining stakeholder tasks and establishing a timeline for completion of the process.

BEST COPY AVAILABLE

INTRODUCTION

Every day, we make numerous environmental decisions or our fellow Pennsylvanians make environmental decisions for us. The quality of Pennsylvania's environmental, economic and public health depends on informed citizens and their individual and collective actions. Often individual actions may not seem important, but when 12 million Pennsylvania residents are all engaging in similar behaviors, there can be a tremendous impact. Additionally, collective actions such as law-making, may seem remote from our day-to-day lives, yet these "decisions of the whole" will affect the quality of our lives and perhaps that of generations to come.

On July 1, 1997, Governor Tom Ridge commissioned 40 individuals, from many walks of life and with many life experiences, to collectively identify what may be Pennsylvania's environmental challenges in the 21st Century. The 21st Century Environment Commission concluded there are five major categories of environmental concerns that will face Pennsylvania in the 21st Century. Pennsylvanians will be challenged by:

- Responsible land use;
- Conserving natural resources for sustainable use;
- A healthy environment for healthy people;
- Developing a new foundation for teamwork; and
- Environmental education, training and stewardship.

It became clear to the commission that environmental education, training and stewardship were not only a challenge in and of themselves, but also key components to the success of the other environmental challenges. There was little comprehensive information on what adult Pennsylvanians know about the environment, what their attitudes were toward these five challenges, and to what degree the Commonwealth citizenry was engaging in particular environmental behaviors.

The *First Pennsylvania Environmental Readiness for the 21st Century Survey Report* is the first of its kind in the nation. It addresses the environmental literacy recommendation in the report of the Pennsylvania 21st Century Environment Commission. Additionally, it makes numerous comparisons between Pennsylvania citizens and United States citizens as a whole and begins to probe some of the public's environmental attitudes and behaviors.

The report consisted of a series of questions that were asked to a random sample of 1,000 adult Pennsylvanians in 15-minute telephone surveys, conducted by Roper Starch Worldwide. The survey instrument was developed from the 1997 National Environmental Education Report Card, and then adapted to meet Pennsylvania's specific needs.

This document is a condensed version of the full report. The full report is located on the Pennsylvania Center for Environmental Education website at www.pcee.org. The survey questions and findings were organized into four categories: 1) environmental literacy; 2) environmental attitudes; 3) environmental behaviors; and 4) environmental education. The survey questions may be found in Appendix 1, page 34. The conclusion section is organized around the five environmental challenges identified in the *Report of the Pennsylvania 21st Century Environment Commission* (they are bulleted above).

THE ESSENCE OF ENVIRONMENTAL EDUCATION[1]

Since the 1970s, environmental education has been characterized as a way of teaching that makes connections between science, technology, economics, policy, people and the environment. Environmental education is fundamentally different from earlier versions of "nature education," because it addresses interrelationships between humans and environment. It also differs from environmental science—the scientific study of those interrelationships—because environmental education is concerned with values and skills as well as knowledge.

In A Nutshell

The following points characterize EE as it is practiced in the United States.

1. *EE includes a human component in the exploration of environmental problems and solutions.* Environmental solutions are not only scientific---they include historical, political, economic, cultural and many other perspectives. This also implies that the environment includes not only pine trees and coyotes, but also buildings, highways, and ocean tankers.

2. *EE rests on a foundation of knowledge about social and ecological systems.* Knowledge lays the groundwork for analyzing environmental problems, resolving conflicts, and preventing new problems from arising.

3. *EE includes the affective domain: the attitudes, values, and commitments necessary to build a sustainable society.* The role for educators in addressing the affective domain is not always easy, but it should include clarifying that differing personal values exist, that these values make it difficult to derive the facts, and that controversy is often motivated by differing value systems.

4. *EE includes opportunities to build skills that enhance learners' problem-solving abilities.* These skills may include:

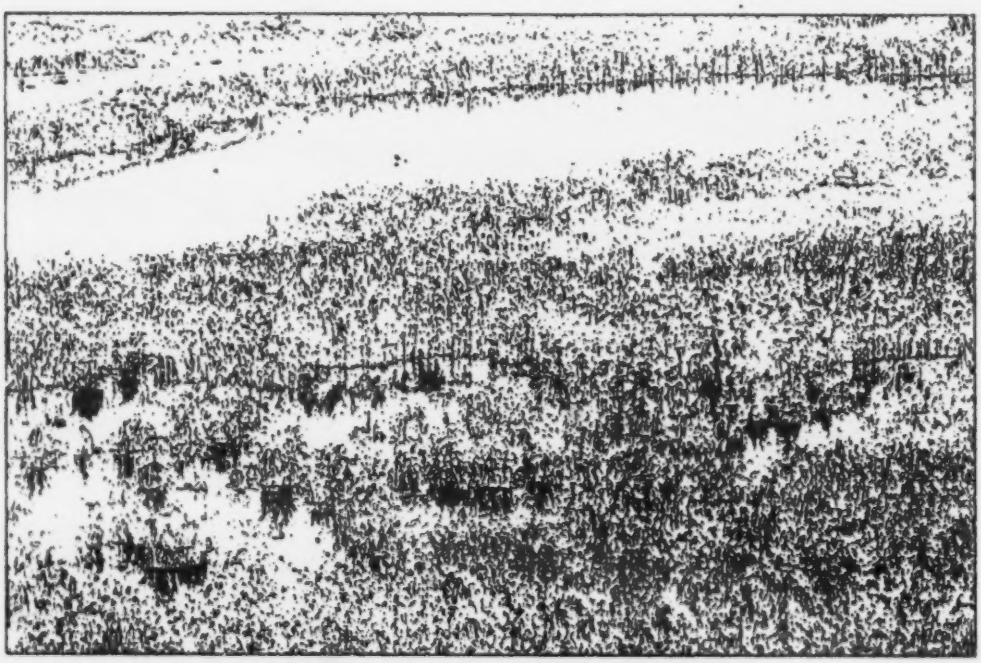
   - Communication: listening, public speaking, persuasive writing, graphic design
   - Investigation: survey design, library research, interviewing, data analysis
   - Group process: leadership, decision making, cooperation

[1] Disinger, John F. and Martha C. Monroe. EE Toolbox - Defining Environmental Education. Page 3. 1994. University of Michigan.

A major tool in the state's efforts to accomplish environmental and economic vitality and sustainability is the environmental education process. Environmental education is a process that must include at least five components. These components are:

Awareness	to help social groups and individuals acquire an awareness and sensitivity to the total environment and its allied problems.
Knowledge	to help social groups and individuals gain a variety of experiences in, and acquire a basic understanding of the environment and its associated problems.
Attitudes	to help social groups and individuals acquire a set of values and feeling of concern for the environment and motivation for actively participating in environmental improvement and protection.
Skills	to help social groups and individuals acquire the skills for identifying and solving environmental problems.
Participation	to help provide social groups and individuals with an opportunity to be actively involved at all levels in working toward a resolution of environmental problems[2].

While information dissemination is an important part of the environmental education process, it is not environmental education and cannot be expected to produce significant or sustainable environmental stewardship.



[2]UNESCO Conference in Tbilisi, Georgia, USSR. 1977.

Pennsylvania's Environmental Literacy

Fact-based Environmental Knowledge

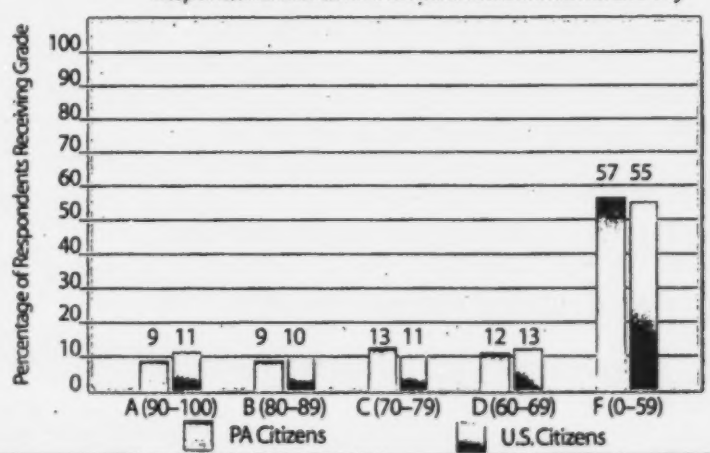
Environmental literacy is important at every age

Adult Pennsylvania residents were asked two sets of questions to assess their fact-based environmental knowledge and their environmental issues knowledge. The first set was a 12-question literacy test the purpose of which was to identify what the state's adults actually know about the environment. The second set of seven questions focused on Pennsylvania adults' perceived knowledge of environmental issues. The purpose of the second set of questions was to identify what adults think they know about environmental issues rather than their actual knowledge.

- **While Pennsylvanians personally take primary responsibility for solving the state's environmental problems and have positive attitudes toward the environment, they, like the nation as a whole, currently have a poor grasp of both environmental knowledge and environmental issues. Lack of basic environmental knowledge by Commonwealth citizens will inhibit progress in environmental stewardship.**

Of note are demographic characteristics within the Pennsylvania population that exhibited significantly lower environmental knowledge levels than the state population as a whole. These groups include individuals with education levels below that of college, females in general, individuals with low incomes and individuals that reside in cities.

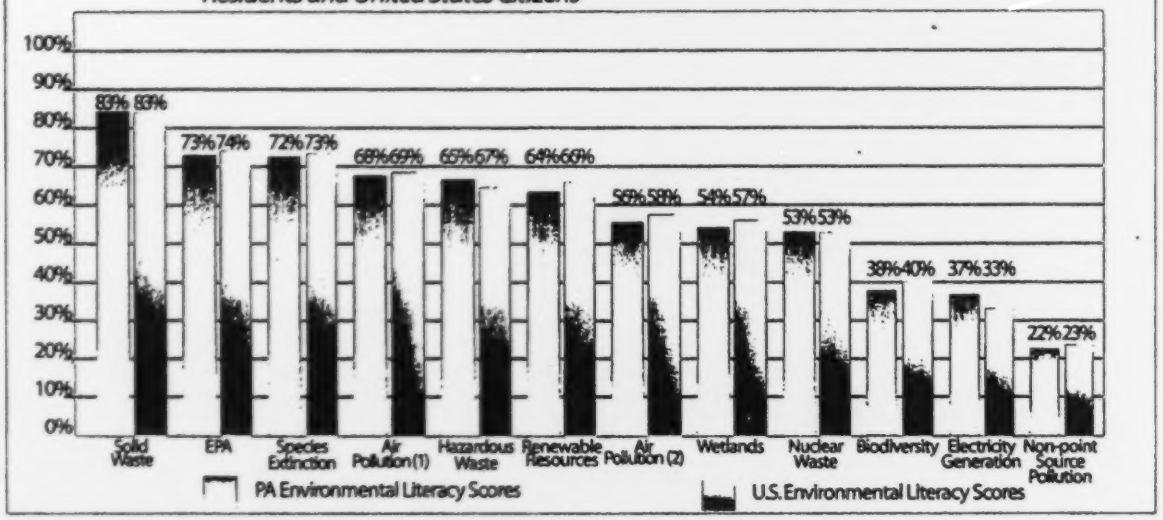
Figure 1: Pennsylvania Respondents' & National Study Respondents' Scores on the Test of Environmental Literacy



Results of Fact-based Environmental Knowledge Questions Test

- Only 31 percent of Pennsylvania adults have a satisfactory basic knowledge about the environment, scoring 70 percent or higher on the literacy assessment. See Figure 1.
- Pennsylvania residents have the same poor environmental literacy as the United States citizenry as a whole.
- Pennsylvanians have above average knowledge about solid waste (83 percent) and average knowledge as to the role of the EPA (73 percent) and why species become extinct (72 percent). Commonwealth citizens have surprisingly little knowledge about non-point source pollution (22 percent), electricity generation (37 percent) and the term "biodiversity" (38 percent).

Figure 2. Comparison of Environmental Literacy Scores for Pennsylvania Residents and United States Citizens



While respondents in this study had a similar overall score on the literacy test as U.S. citizens, when comparing state to national data on each individual question, Pennsylvania respondents were one to four percentage points below the national average on 10 of the 12 questions. Pennsylvanians scored higher than the national average on two questions: electricity generation (+ 4 percentage points) and wetlands (+3 percentage points.) These scores were still low. See Figure 2.

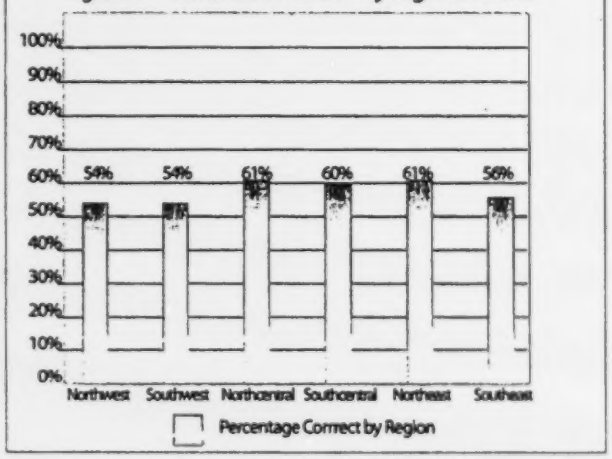
An analysis of demographic features revealed a number of significant findings. Respondents whose formal education did not include a college degree had literacy scores significantly lower than individuals with a college degree. In addition, male respondents knew significantly more about the environment than did female respondents.

Additionally, residents living in towns ("suburban" and "small") and those living in rural farm areas knew more about the environment than did residents living in cities ("large," "medium" or "small"). Respondents with an annual household income less than $25,000 knew less about the environment than all other economic groups.

Of note is that some 40 percent of respondents, who when provided with four possible answers on a biodiversity question, chose not to guess, but rather volunteered a response of "don't know." More than one-fourth (26 percent) of Pennsylvanians answered the same way on a question concerning wetlands.

For the purposes of this study, Pennsylvania was divided into six regions. For more information on these regions, see Appendix 3, page 42. Looking at Pennsylvania scores at the regional level, although all were low, three regions had scores below average but still passed the test. The remaining three regions failed the test. See Figure 3.

Figure 3. Environmental Literacy Regional Scores



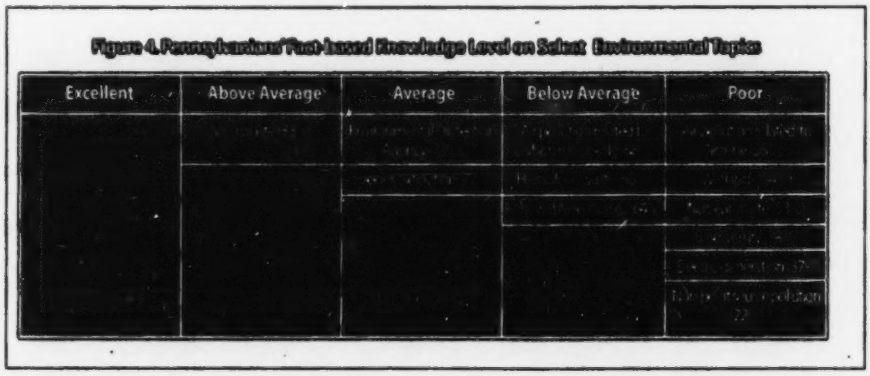
How's Your Environmental Knowledge?

Before reading the next section, turn to page 36 to test your environmental knowledge base. Begin with question 10.1 and continue to question 10.12. See how you compare to your fellow Pennsylvanians.

Environmental Literacy Test and What It Means to Pennsylvanians

The environmental literacy test, which was included in this study, does not purport to be a comprehensive, definitive evaluation of Pennsylvanians' environmental literacy—a final exam, as it were, but rather an indicator of environmental literacy. While the subject areas covered were wide ranging, nevertheless 12 multiple choice questions hardly exhaust the possible topics of inquiry.

Question 10.1 There are many different kinds of animals and plants, and they live in many different types of environments. What is the word used to describe this idea? ***It is biodiversity.***



Few Pennsylvanians recognize the term biodiversity. Out of a field of four possible answers, only 38 percent of the general public was able to choose the correct term. The most common response (40 percent) to this question was "don't know."

Biodiversity is one indicator of a given environment's health and stability. It is the sum of the variety of different species plus the quality of each of the species in a given area. An indicator of a healthier urban environment in Pennsylvania would be a bird feeder with chickadees, cardinals, finches and sparrows, as opposed to one that attracted only starlings. An excellent example of a biologically diverse aquatic system in Pennsylvania is French Creek, located in northwestern Pennsylvania. This creek is considered biologically diverse because it has more than 80 species of fish and 27 species of fresh water mussels. Unfortunately, many of these species have been eliminated from other parts of the state and the nation.

For more information on the topic of biodiversity and the variety of plant and animal species in Pennsylvania, visit the following websites: www.dcnr.state.pa.us (click forestry) (click biodiversity), www.fish.state.pa.us (in site search list biodiversity) and www.pgc.state.pa.us (click wildlife).

Each year hundreds of Pennsylvanians monitor the biological diversity of Pennsylvania's waterways

Question 10.2: Carbon monoxide is a major contributor to air pollution in the U.S. Which of the following is the biggest source of carbon monoxide? ***It is motor vehicles. Most Pennsylvanians (68 percent) knew the answer was motor vehicles.***

Carbon monoxide (CO) is a colorless, odorless gas that is a product of incomplete combustion from automobile exhaust, as well as heating devices, industrial processes, etc. This gas is

hazardous because it binds tightly to red blood cells reducing the transport of oxygen to body tissues. The majority of Pennsylvania's carbon monoxide emissions come from motor vehicles [especially during rush hour traffic] in urban areas. Pennsylvania monitors outdoor carbon monoxide levels to make sure they do not exceed the federal standard set to protect public health. There have been no exceedences of the federal carbon monoxide standard in Pennsylvania for many years.

While outside CO levels do present short and long term risks, indoor levels can be of immediate danger. Even in well-ventilated rooms, CO will reach life-threatening levels. For this reason, never operate gasoline-powered equipment indoors, no matter how well ventilated the room may be.

Question 10.3: How is most of the electricity in the U.S. generated? ***It is burning oil, coal and wood.***

Surprisingly few (37 percent) Pennsylvanians knew the answer was burning oil, coal and wood. Nearly one third (30 percent) believed the answer was a cleaner source of electric generation, hydroelectric power plants. Commonwealth citizens, however, scored four percentage points higher than did the nation as a whole on this question.

With deregulation of the electric industry, it is increasingly important for consumers to be educated about the many choices they will face, including understanding the various fuels used to generate electricity and the associated economic and environmental issues. To ensure a safe, reliable and affordable energy supply, the industry relies on a varied mix of generation sources, which can be dependent on geography (i.e. where natural resources are located). Almost 60 percent of Pennsylvania's electric generation comes from coal. Because coal is a naturally abundant resource in this part of the country, it is economically feasible to use, and therefore represents a significant portion of Pennsylvania's energy generation.

Question 10.4: What is the most common cause of pollution of streams, rivers and oceans? ***It is surface water running off yards, city streets, paved lots and farm fields.***

Less than one in four Pennsylvanians (22 percent) identified that it was surface water that runs off yards, city streets, paved lots and farm fields. The most common, yet incorrect response (47 percent), was waste dumping by factories.

This type of general run-off into streams is called non-point source pollution, because it cannot be identified as coming from a single point such as a pipe. When run-off enters the stream, it may carry many things along with it that were loose in the environment. The collective result of run-off in waterways can change the physical and chemical properties of streams. This may cause the waters to be unsuitable for many or all of the organisms that previously lived there and make the waters unsafe as a source of drinking water.

The most significant sources of non-point source pollution in Pennsylvania are abandoned mine drainage, and agricultural and urban runoff. Mine drainage often deposits unhealthy levels of iron, aluminum and other metals into the state's waterways. Agricultural run-off typically contributes soil particles, as a result of soil erosion, and excess fertilizer from farm fields into the streams. The collective actions of individual citizens also contribute to water pollution through activities such as oil leaks from motor vehicles or improper disposal of chemicals in the home.

Question 10.5: Which of the following is a renewable resource? ***It is trees.***

The majority of Pennsylvanians (64 percent) knew that trees are a renewable resource. The next most common answer (13 percent) was "don't know" and then "oil" (11 percent).

A renewable resource is something that can be replenished in a reasonable amount of time, such as trees. Most Pennsylvania forests regenerate themselves naturally following tree harvesting. Oil, coal and iron ore formation result from geologic processes that can span billions of years and are created under very specific environments and geologic conditions (although in the span of several billions of years, these, too, can be considered renewable resources).

Pennsylvania's 17 million acres of forests are among the largest and most valuable in the United States, generating $5 billion per year in the forest products industry and another $4 billion in recreation and tourism. The 2.1 million-acre state forest system and a number of industry-owned forests have been certified as sustainably managed, and several other programs exist to promote sustainable forestry practices by private, non-industrial forest landowners. The term "sustainability" means meeting the needs of the present without compromising the ability of future generations to meet their own needs. Forests that are managed in an environmentally friendly and sustainable manner can continuously provide the many benefits and materials that we need.

Question 10.6: Ozone forms a protective layer in the Earth's upper atmosphere. What does ozone protect us from? ***It is harmful, cancer-causing sunlight.***

A little more than half (56 percent) of Pennsylvanians knew the answer was harmful, cancer-causing sunlight. Twenty six percent (26 percent) incorrectly chose global warming.

Ozone forms a protective layer in the Earth's upper atmosphere. This layer of ozone shields the earth from ultra-violet radiation from the sun. Increased exposure to ultra-violet radiation increases incidence of skin cancer and cataracts in humans and may harm the environment as well. The best prevention against skin cancer is to reduce direct exposure to sunlight (especially between 10:00 a.m. and 4:00 p.m.), use sunscreen every day with a sun protection factor of at least 15, and wear a broad-brimmed hat, sunglasses, long sleeves and long pants when spending time outdoors. For more information on skin cancer visit the Pennsylvania Department of Health website at: www.health.state.pa.us.

The "ozone layer" is not to be confused with ground-level ozone, which is a harmful ingredient of smog. Unhealthy ground-level ozone and the protective layer of ozone in the upper atmosphere have the same chemical makeup, but have very different environmental effects. Ground-level ozone is caused when air pollution heats up in the hot, summer sun. One result of increased ground-level ozone is that it is hard for some people to breathe. Ozone Action Days are forecast when ground-level ozone concentrations are predicted to reach unhealthy levels. Businesses, organizations and the media partner together to alert the public when an Ozone Action Day is expected.

Question 10.7: Where does most of the garbage in the U.S. end up? ***It is in landfills.***

Pennsylvania, pat yourself on the back for this question! A full 82 percent of Pennsylvanians correctly chose landfills.

Currently, most of Pennsylvania's garbage (68 percent+) is sent to the 49 permitted landfills in the state. Between 26 percent and 32 percent of trash (depending on calculation methods) is being recycled, with the remaining 11 percent being burned in Pennsylvania's six waste-to-energy facilities. In this survey, Pennsylvanians gave the green light to the idea of striving for a 35 percent recycling rate in the coming years. This is an important goal because recycling saves resources.

Question 10.8: What is the name of the primary federal agency that works to protect the environment? ***It is the U.S. Environmental Protection Agency.***

Almost two out of every three (73 percent) Pennsylvanians knew that the U.S. Environmental Protection Agency is primarily responsible to protect the environment at the federal level.

"The mission of the U.S. Environmental Protection Agency (EPA) is to protect human health and to safeguard the natural environment—air, water, and land—upon which life depends. Under the National Environmental Education Act, EPA provides leadership and support to increase the public's environmental knowledge and ensure that education is a mechanism, along with regulation, enforcement, and cleanup, for protecting human health and the environment." To learn more about the EPA, visit their website at: www.epa.gov.

The majority of environmental enforcement occurs at the state level. The Pennsylvania Department of Environmental Protection (DEP) is often charged with implementing federal environmental laws, as well as those environmental laws and regulations established by the state of Pennsylvania. To learn more about DEP, visit its website at: www.dep.state.pa.us.

Question 10.9: **Which of the following household wastes is considered hazardous waste?** ***It is batteries.***

Sixty-five percent (65 percent) of Pennsylvanians chose the correct answer, **batteries.** About one in five (21 percent) incorrectly chose plastic packaging.

Some types of **batteries** contain metals and other substances that can be harmful to the environment. Nicad batteries, lead-acid batteries and button batteries should be recycled rather than thrown away.

To recycle these batteries, take them to your local battery store when you purchase a replacement or take them to your local household hazardous waste collection site. For more information on household hazardous waste collections in your community, call the Pennsylvania Recycling Hotline at (800) 346-4242. The number also should be located in the blue pages of your phone book. Look under "State Government - Environmental Protection."

Question 10.10: **What is the most common reason that an animal species becomes extinct?** ***Today, the answer is their habitats are being destroyed by humans.***

About one out of every three (72 percent) Pennsylvanians correctly chose **habitats are being destroyed by humans.**

A total of 507 species of plants and animals found in Pennsylvania are extinct or identified as being in jeopardy as a result of degraded and destroyed habitats. Half of Pennsylvania's native fish species and 58 percent of our freshwater mussels have been lost or are at risk of being lost.

Reversing these habitat driven trends will take individual and collective efforts. As an expression of individual concern one can create butterfly gardens, provide houses for birds and bats and support schoolyard habitat projects. Collectively, we need to become involved in sustainable land use planning (at the municipal, county and state level) that provides high quality environments for native species, while still allowing growth and development within our communities.

Most importantly, educate yourself about the needs of our wild neighbors and about the opportunities for their conservation. Information on conservation groups in your area may be found at www.dep.state.pa.us. Click on "Subjects," then Conservation Directory. One starting point for information on land use is at www.dced.state.pa.us. Click "local government services" and then click "land use."

Question 10.11: **Scientists have not determined the best solution for disposing of nuclear waste. In the U.S., what do we do with it now?** ***We store and monitor the waste.***

Pennsylvanians correctly chose **store and monitor** the nuclear waste 53 percent of the time. The next most common response (19 percent) was "don't know," followed by the incorrect answer "dump in landfills" (14 percent).

The Federal Nuclear Waste Policy Act of 1982 requires the United States Department of Energy to select, characterize and develop a repository for the disposal of spent nuclear fuel and high-level radioactive waste from civilian nuclear power plants and federal department of energy facilities. The current projected date for the completion of a federal repository is the year 2010. Presently, nuclear power plants, including the nine in Pennsylvania, store their spent nuclear fuel on-site in spent fuel pools. Unfortunately, due to lack of a permanent repository, the spent fuel pools at most reactor sites have filled to or are near capacity. As a result, several nuclear power plants in Pennsylvania are storing some of their spent nuclear fuel on-site in dry storage casks.

Question 10.12: **What is the primary benefit of wetlands?** ***The correct answer is wetlands clean the water before it enters lakes, streams, rivers, or oceans.***

Again, a little more than half of Pennsylvanians (54 percent) correctly identified the benefits of wetlands as **helps clean the water before it enters lakes, streams, rivers or oceans.** About one in four (26 percent) responded that they "don't know."

Wetlands are complex natural systems that perform a variety of beneficial functions such as regulating water flow by detaining storm flows for short periods thus reducing flood peaks, improving water quality by retaining or transforming excess nutrients and by trapping sediment and other potential pollutants. Wetlands also provide important wildlife and plant habitat such as breeding grounds and nesting sites for waterfowl and other animals, as well as numerous rare, threatened and endangered plant and animal species.

Over the past decade, regulatory programs, both at the state and federal levels, have helped to reduce the loss of wetlands by requiring that impacts to wetlands be avoided and minimized. Where impacts cannot be avoided it is now required that wetlands be replaced through creation or restoration. In addition to these regulatory efforts, many private, local, state and federal programs now exist to protect and restore wetland resources.

It has been estimated that nearly half of Pennsylvania's wetlands are gone. Through the efforts of U.S. Fish & Wildlife, the Natural Resources Conservation Service, and the Pennsylvania Department of Environmental Protection—and with the cooperation of private landowners—many wetlands are now being restored. This effort has resulted in a recovery of more than 3,700 acres of wetlands in the Commonwealth over the past decade.

Knowledge about Environmental Issues

Each individual surveyed was asked what they thought they knew about seven major Pennsylvania environmental issues. The issues were 1) air pollution, 2) water pollution 3) natural resource conservation, 4) suburban sprawl, 5) watershed management, 6) sustainable development and 7) biodiversity. These issues were identified in Pennsylvania's 21st Century Environment Commission Report[3]. One of the purposes of the commission's report was to identify the environmental challenges Pennsylvania will face in this new century.

- **Pennsylvanians only feel knowledgeable about some of Pennsylvania's major environmental issues.** See Figure 5.

Figure 5. Pennsylvanians Self-Identified Knowledge of Select Environmental Issues

Knowledgeable	Not Knowledgeable
Air pollution (68%)	Suburban sprawl (41%)
Water pollution (67%)	Watershed management (34%)
Natural resources (53%)	Sustainable development (26%)
	Biodiversity (22%)

Looking at the demographic factors associated with this set of questions, respondents in the age group "25 to 44" self-reported that they knew significantly less than all other age groups about the environmental issues included in this study. When considering education, those respondents with a high school diploma or less said they knew the least about environmental issues. Males reported that they knew more about these issues than did females.

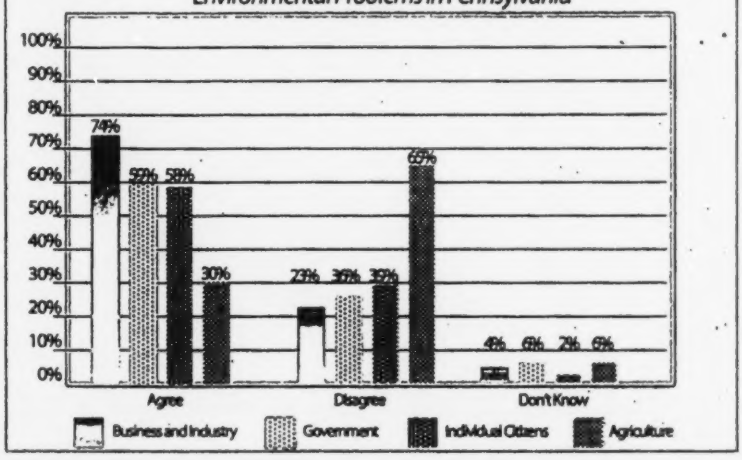
[3] Report of the Pennsylvania 21st Century Environment Commission (1998). Pennsylvania Department of Environmental Protection. www.21stcentury.state.pa.us.

Causes of Pennsylvania's Environmental Problems

Respondents were asked to identify to what extent they believed business and industry, government, agriculture or individual citizens were responsible for environmental problems in Pennsylvania. See Figure 6.

- Nearly three quarters of Pennsylvanians (74 percent) hold business and industry primarily responsible for causing environmental problems in Pennsylvania.
- A little more than half of Pennsylvania citizens hold government (59 percent) and themselves, as individual citizens (58 percent), almost equally responsible for Pennsylvania's environmental problems.
- The public (30 percent) does not see agriculture as a major cause of environmental problems.

Figure 6. Pennsylvanians' Perception of Sources that have Caused Environmental Problems in Pennsylvania

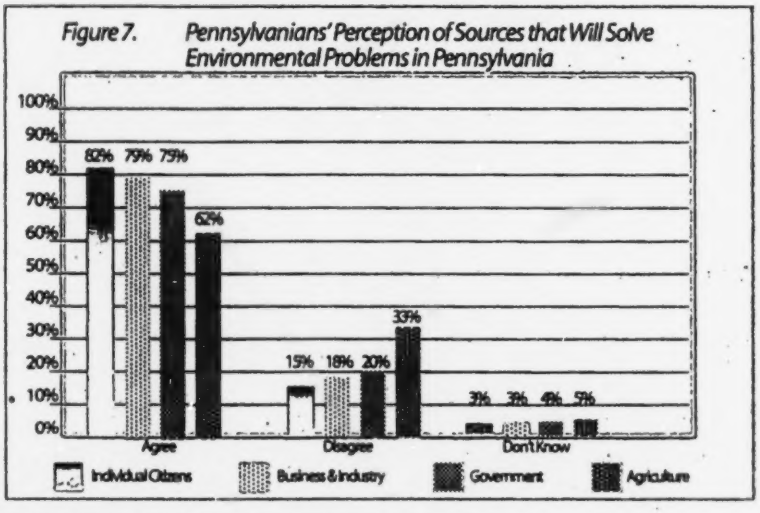


Solving Pennsylvania's Environmental Problems

After respondents were asked about major causes of environmental problems, they were then asked whose actions it will depend upon to solve Pennsylvania's environmental problems. They were asked to identify to what extent they believe business and industry, government, agriculture or themselves as individual citizens are responsible for solving environmental problems in Pennsylvania. See Figure 7.

- Pennsylvanians believe that they, as "individual citizens," need to take primary responsibility for solving the state's environmental problems.
- The majority of the Pennsylvania public believes individual citizens (82 percent), business and industry (79 percent), government (75 percent) and agriculture (62 percent) all have a major role in solving environmental problems in the Commonwealth.

Figure 7. Pennsylvanians' Perception of Sources that Will Solve Environmental Problems in Pennsylvania

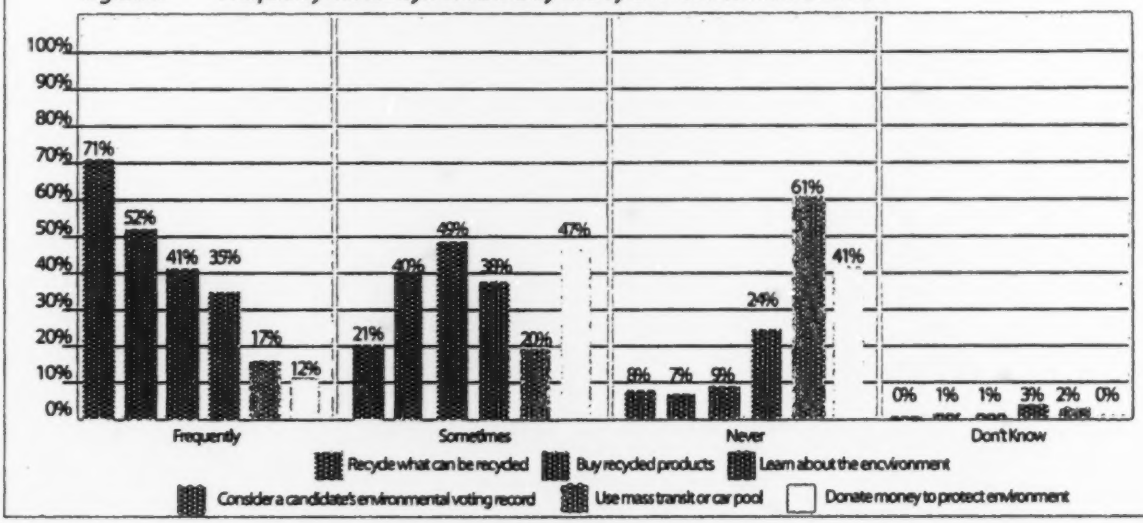


Looking at the demographic characteristics associated with this question, it was found that the higher the respondent's income, the more likely he/she believed that business and industry will contribute to solving Pennsylvania's environmental problems. It also was found that female respondents agreed significantly more strongly than males that government will contribute to solving Pennsylvania's environmental problems.

Day-To-Day Environmental Behaviors

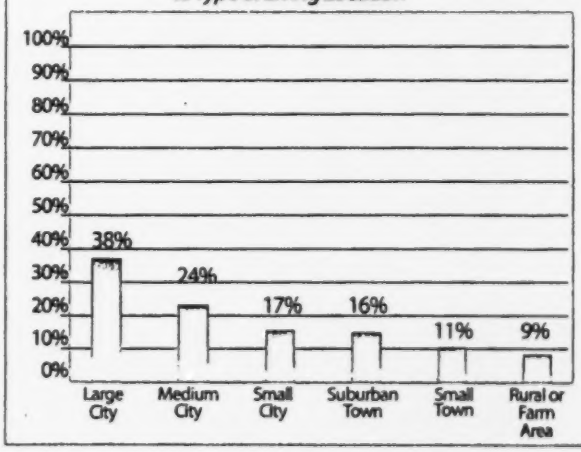
Respondents were asked about their day-to-day patterns for six environmental behaviors. The behaviors included 1) recycling, 2) buying recycled products, 3) learning about the environment, 4) considering a candidate's record on protecting the environment before voting, 5) using mass transit or car pooling and 6) donating money to environmental causes. Response choices were "frequently," "sometimes," or "never." Of these six day-to-day selected behaviors, Pennsylvanians reported that they "frequently" engage in two of them, "sometimes" participated in three and virtually "never" engaged in one. See Figure 8.

Figure 8. Frequency of Pennsylvanians' Day to Day Environmental Behaviors



- The majority of Pennsylvanians frequently recycle (71 percent) and buy recycled products (52 percent).
- Pennsylvanians sometimes learn about the environment (49 percent), donate money to an organization working to protect the environment (47 percent) and consider a candidate's record on protecting the environment before voting (38 percent).
- The majority of Pennsylvania residents (61 percent) never use mass transit or car pooling instead of driving alone.

Figure 9: Use of Mass Transit or Car-Pooling Related to Type of Living Location



Looking at the demographics associated with the six environmental behaviors, it was found that respondents with a high school degree or lower participated significantly less in day-to-day environmental behaviors than did individuals with more formal education.

There is a significant association between where individuals live and their reported use of mass transit and car-pooling. That association is perfectly correlated with population densities in relationship to use of mass transit and carpooling. See Figure 9.

Pennsylvanians' Environmental Attitudes Towards Economics and the Environment

Participants first were asked what they thought the relationship was between economics and the environment. They could choose the responses, "can go hand-in-hand" or "must choose between the two." A second question asked each respondent to choose between economic development and environmental protection.

- **Citizens of the Commonwealth (64 percent) believe that protecting Pennsylvania's environment and economic development can go hand-in-hand.**
- **When asked to choose between the environment and the economy, the majority of Pennsylvanians (63 percent) chose the environment.**

Twenty-two percent chose economic development. Pennsylvanians, however, chose economic development significantly more often and the environment significantly less than did Americans as a whole, on either the 1997 or 1998 National Report Card.

Looking at the demographics associated with this question, some significant differences were identified. Older respondents and those with higher incomes believed that protecting Pennsylvania's environment and economic development "can go hand-in-hand" significantly more often than younger respondents or those with lower incomes.

This question also had been asked over the years in the National Environmental Report Card studies. When comparing Pennsylvanians with the United States citizens, over the last two years, there is no significant difference in responses. Pennsylvanians were just as likely to believe that environmental protection and economic development can go hand-in-hand as the nation as a whole. See Figure 10.

Looking at demographic considerations related to choosing between the environment and the economy, it was found that of the respondents who chose "economic development" there were significantly more older than younger respondents favoring the economy. Additionally, those that live in "large cities" in Pennsylvania also chose "economic development" over "environmental protection" significantly more often. See Figure 11.

Figure 10. A Comparison of Pennsylvania and National Responses to the Compatibility of Environmental Protection and Economic Development

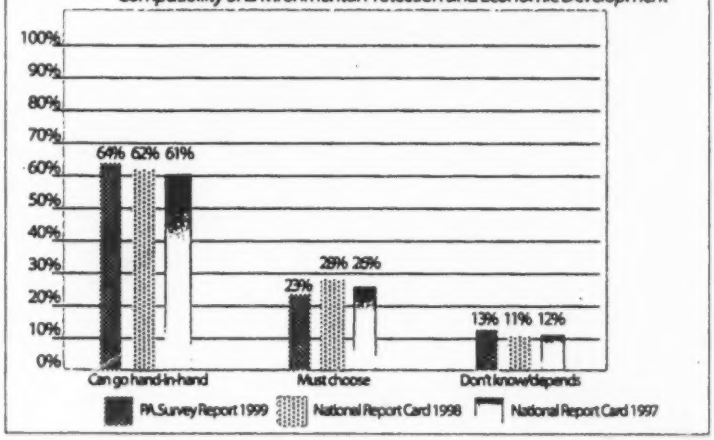
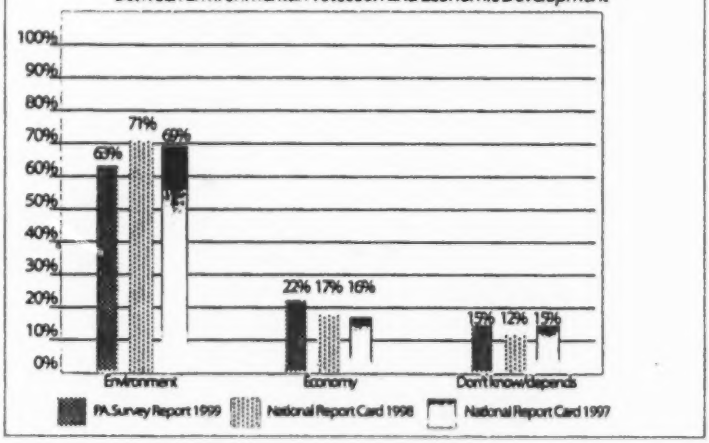
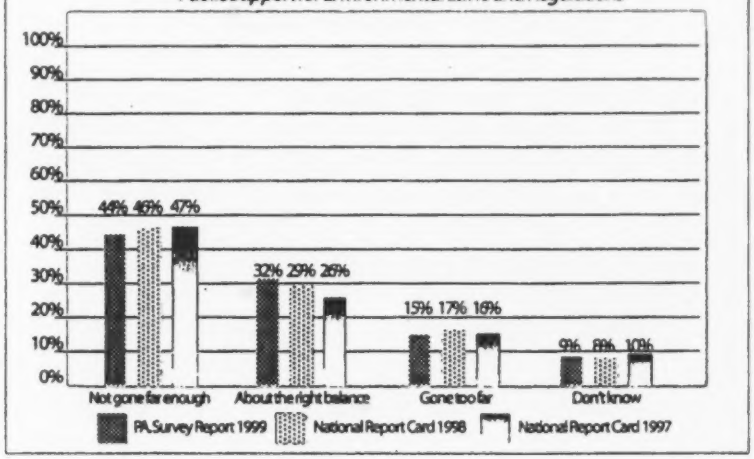


Figure 11. Comparison of Pennsylvania and National Responses to Choosing Between Environmental Protection and Economic Development



Public Attitude Towards Environmental Protection

Figure 12. Comparison of Pennsylvania and National Responses on Public Support for Environmental Laws and Regulations



Pennsylvanians were asked about their support for environmental laws and regulations. They could choose the response that environmental laws and regulations have 1) "gone too far," 2) "not gone far enough" or 3) have "struck the right balance." See Figure 12.

- **Pennsylvanians are favorable toward environmental laws and regulations.** The most frequent response (44 percent) was that environmental laws and regulations have "not gone far enough." Nearly one-third (32 percent) believe we have "struck the right balance." Only 15 percent believed Pennsylvania environmental protection laws have "gone too far."

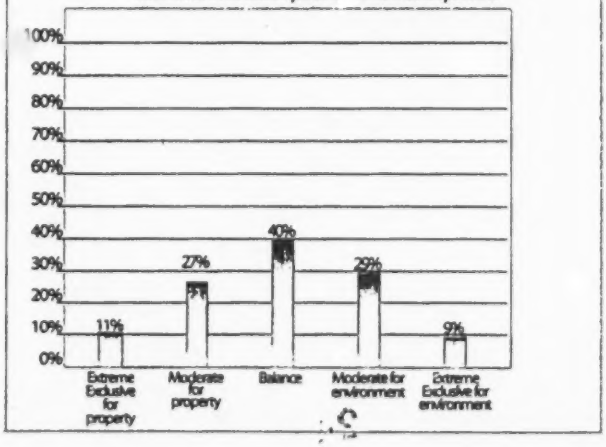
Analysis of demographic factors reveals that all age group responses were closest to "not far enough." As respondents increased in age, however, so did the likelihood that they would perceive environmental laws and regulations as having "gone too far." Young adults favored "not gone far enough" more often than other age groups. There was no age-related pattern concerning the "struck the right balance" response option.

"Small town" respondents perceived that the laws and regulations have "gone too far" more often than respondents living in "rural or farm areas." Those living in large cities more strongly favored "not gone far enough," while "medium city" residents favored "struck about the right balance" more than other areas.

While both landowner and non-landowner responses were closest to "not far enough," respondents who own land perceived that environmental laws and regulations have "gone too far" or "struck about the right balance" more often than non-landowners. Additionally, female respondents perceived that environmental laws and regulations have "not gone far enough" more often than male respondents.

Comparing national responses to those of Pennsylvania, there was a significant difference. Pennsylvanians chose "struck the right balance" significantly more often than the nation as a whole.

Figure 13. Pennsylvanian Support for Private Property Rights vs. Environmental Impact of and Development



Pennsylvanians' Attitudes Towards Property Rights

Property rights vs. civic responsibility is a significant issue in Pennsylvania, as it is across the country. Pennsylvania citizens were asked to indicate their level of support for either private property rights of landowners or the environmental impacts of land development on a scale from 1 to 10. A response of 1 indicated exclusive support for private property rights while a 10 indicated exclusive support for the environmental impacts of land development. Balanced support would be indicated by a response of 5 or 6. See Figure 13.

- **Pennsylvanians (40 percent) most often chose a balance between private property rights of landowners and environmental impacts of land use.** Additionally, the number of Commonwealth citizens that tended to favor either property rights or protection of the land was approximately balanced in both the moderate opinion range and the extreme opinion category.

Regional responses favoring the environment were relatively consistent across the state, with the exception of the northwest region. Northwest respondents chose private property rights more often than residents from the rest of the state.

Extreme responses, those exclusively favoring considerations for environmental impacts (10) and those exclusively favoring private property rights (1) were found on opposite sides of the state. Both the eastern and the southcentral counties had the most responses exclusively favoring protection of the land, while western counties had the most extreme responses favoring private property rights.

Looking at the demographics associated with this question, a relationship was found between educational levels and support for protection of environmental impacts of land development. It was found that individuals with more education (bachelor's degree and doctoral or terminal degrees, but not master's degrees) favored protection of land from development over private property rights.

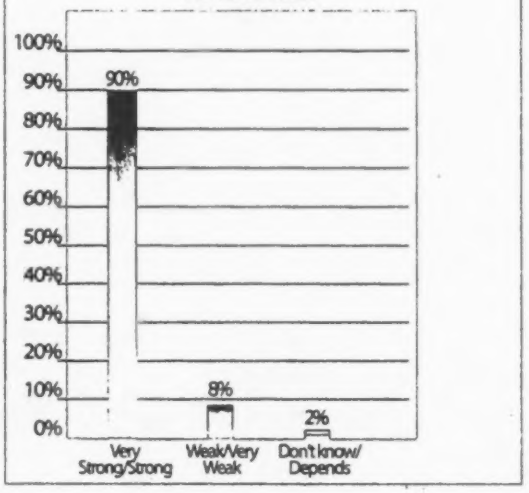
Linking Environmental Health and Human Health

Respondents were asked how much of an effect they think the environment has on human health. See Figure 14.

- **Pennsylvanians (90 percent) clearly understand the link between environmental health and human health.**

Looking at demographic differences, it was found that although older respondents perceived a strong relationship between the environment and human health, their agreement was significantly less strong when compared to younger respondents. Additionally, those respondents that live in "large cities" and females had significantly stronger attitudes related to the link between environmental and human health.

Figure 14. Pennsylvanians' Opinions on the Link Between Environmental and Human Health



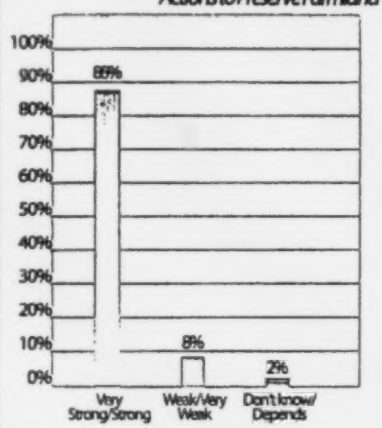
Attitudes Towards Sustainable Development

Sustainable development is a relatively new concept with numerous initiatives on the state and national level. Suburban sprawl, farmland preservation and waste reduction are all environmental issues in Pennsylvania, which are integral components of any sustainable development plan. The next series of questions focused on developing a better understanding of attitudes on several sustainable development issues in the Commonwealth.

Farmland Preservation

Agriculture has a major economic influence on Pennsylvanians' livelihood. Over the years there has been increased discussion concerning the conservation of farmland within the Commonwealth. Respondents were

Figure 15. Pennsylvanians' Favoring Specific Actions to Preserve Farmland

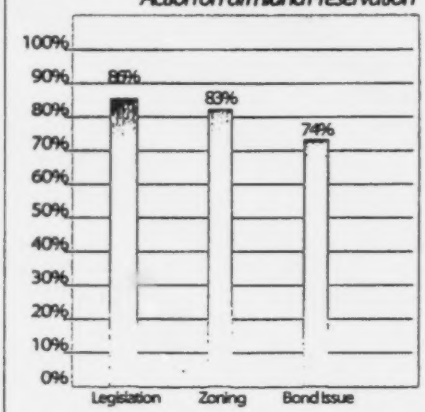


asked whether there should be steps taken to preserve Pennsylvania's farmland and, if so, how strongly they favor three options for farmland preservation. See Figures 15 and 16.

- **The majority of Pennsylvanians (88 percent) support farmland preservation in Pennsylvania.**
- **Of the three proposed action steps for farmland preservation, Pennsylvanians (86 percent) most often chose laws to protect the state's farmland, followed by support for zoning ordinances (83 percent).**

Looking at the demographics associated with this question, it was found that residents with an eighth grade education or less favored local zoning ordinances to protect farmland significantly less strongly than did residents with higher education levels.

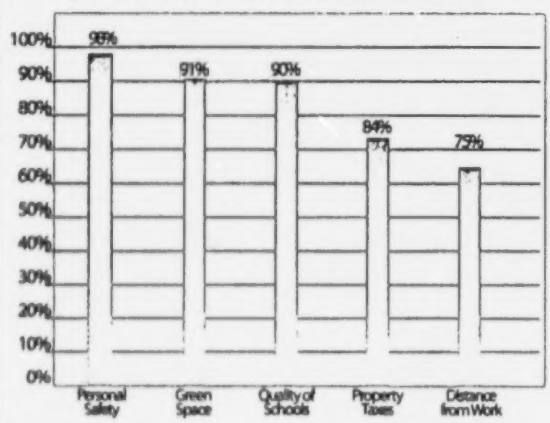
Figure 16. Pennsylvanians' Opinions on Preferred Action of Farmland Preservation



The three proposed action steps for farmland preservation that were presented for comment were 1) a "bond issue" to protect farmland, 2) changing local "zoning ordinances" to protect farmland and 3) having "state laws" designated to protect farmland.

The highest level of support for farm preservation legislation came from respondents in the northcentral and southcentral (91 percent respectively) regions of the state. Although the majority of respondents in the northwest and northeast regions were favorable to all three proposed actions to preserve farmland, they agreed significantly less strongly with bond issues than did the other four regions in the state. Respondents from the southcentral region favored state laws significantly more strongly than did the other five regions.

Figure 17. Importance in Choosing a Place to Live



Choosing A Place to Live

The 21st Century Environment Commission identified suburban sprawl as the most pressing environmental issue of concern in Pennsylvania. Pennsylvania residents are taking more space now for residential living than ever before in our state's history. An effort was made to identify the primary factors involved in this trend.

The next set of questions was designed to determine how important five factors are in an individual's choice of where he/she lives. The factors were 1) quality of schools, 2) personal safety, 3) property taxes, 4) distance from work and 5) green space. See Figure 17.

- **Personal safety (98 percent) is almost an exclusive factor that Pennsylvanians considered when choosing a place to live. Green space (91 percent) and quality of schools (90 percent) also are factors that receive much consideration. To a lesser degree, respondents considered property taxes (84 percent) and distance to work (75 percent) as factors to consider when deciding where to live.**

Factoring in demographic characteristics, it was found that individuals with higher incomes considered "personal safety" significantly more important when deciding where to live than did other respondents. Landowners and individuals with higher incomes considered "quality of schools" significantly more important than other groups. Additionally, older respondents consider the "quality of schools" significantly less important when deciding where to live than did younger respondents.

Older respondents and landowners considered "property taxes" significantly more important when deciding where to live than did younger respondents and those that do not own land. Respondents with more education considered "property taxes" significantly less important than did respondents with less education.

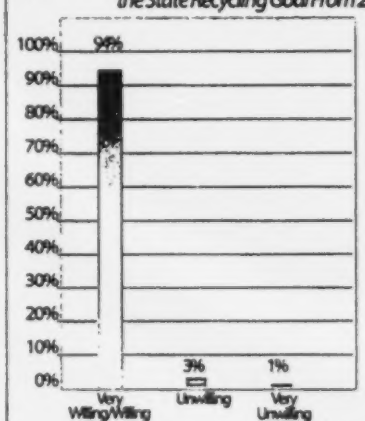
When looking at demographic differences related to distance to work, those living in a "large city" found "distance to work" to be more important than respondents living in "rural or farm areas." It also was found that older respondents, particularly over the age of 65, and males considered "distance to work" significantly less important when deciding where to live. The northwest region respondents considered "distance to work" significantly less important when deciding where to live than did the other five regions.

Recycling Collection Goal

The public was informed that the state would like to raise its recycling collection goal from 25 percent to 35 percent. Respondents were asked how willing they would be to increase their household recycling efforts to reach the 35 percent level. See Figure 18.

- **The state has public support to strive for a 10-percentage point increased recycling effort by Pennsylvania residents.** Ninety-four percent (94 percent) of the public is willing to work for an increased recycling goal.

Figure 18. Pennsylvanians' Willingness to Increase the State Recycling Goal From 25% to 35%



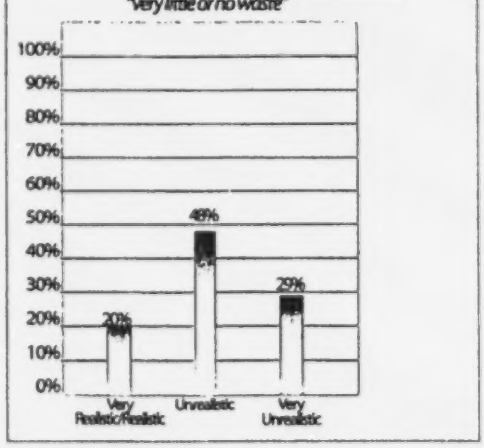
Waste Reductions

The *21st Century Environment Commission Report* suggested that in this century Pennsylvanians would generate "very little or no waste." The public was polled on how realistic they thought this statement is. See Figure 19.

- **Three out of every four Pennsylvanians (77 percent) could not visualize "very little or no waste" in the 21st Century.**

Considering demographic factors, respondents with more education perceived the suggestion that Pennsylvanians will generate "...very little or no waste" in the next century to be significantly less realistic than did respondents with less education. Only those individuals with an eighth grade or less education thought the suggestion was realistic.

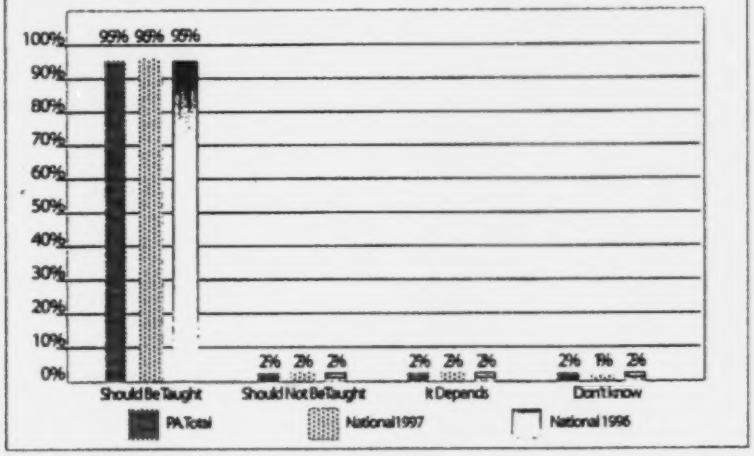
Figure 19. Pennsylvanians' Opinions on Reducing Pennsylvania's Waste in the 21st Century to "very little or no waste"



All income brackets perceived the suggestion that Pennsylvanians will generate "very little or no waste" in the next century as unrealistic. The higher the respondent's income, the less realistic he/she felt the suggestion was. Females tended to believe the suggestion less often than males.

Environmental Education and Pennsylvania Schools

Figure 20. Belief about Environmental Education Being Taught in Schools



Pennsylvania residents were asked two questions related to environmental education and schools. They were asked if environmental education should be provided in schools and if schools in their community provided environmental education. See Figure 20.

- **By an overwhelming majority (95 percent), Pennsylvanians want environmental education taught in schools.** Only 2 percent of state residents said "no."
- **Pennsylvanians have the same strong support for environmental education in schools (95 percent) as the nation as a whole** (96 percent in the 1997 National Report Card and 95 percent in the 1996 National Report Card).
- **Half of Pennsylvanians (59 percent) know if their community schools include environmental education in their curriculum.** Commonwealth citizens want environmental education provided in schools and environment and ecology has been required in schools for many years. Yet, only a little over half of those interviewed know if their community schools include environmental education in their curriculum.

At the Pennsylvania regional level, all regions were supportive of environmental education in their schools. Of note is the 100 percent consensus for environmental education in schools of the northcentral counties.

CONCLUSIONS

This study has identified some strengths, weaknesses and misunderstandings in Pennsylvanians' purview of the environment. Most environmental problems are complex and interrelated. Many of the topics discussed below, such as land use or transportation, involve more than one of the five environmental challenges. They are however, organized and discussed in relation to the organization of the ***Report of the Pennsylvania 21st Century Environment Commission.***

Throughout the survey many questions were asked to address the five environmental challenges. Often, conclusions were based on the responses to multiple questions. An example is the statement concerning air issues. The conclusion, "The public needs to be more involved in the entire environmental education process for air pollution issues related to individual transportation choices" was drawn from the combined results of four separate questions. Two questions were knowledge based, one attitudinal and the fourth query was a behavior question.

Preeminent Conclusion

While Pennsylvanians personally take primary responsibility for solving the state's environmental problems and have positive attitudes toward the environment, they, like the nation as a whole, currently have a poor grasp of both environmental knowledge and environmental issues. Lack of basic environmental knowledge by Commonwealth citizens will inhibit progress in environmental stewardship.

Responsible Land Use

The *Report of the Pennsylvania 21st Century Environment Commission* identified responsible land use as Pennsylvania's number one environmental challenge for the 21st Century. This survey included numerous questions in an effort to identify some strategic information about Pennsylvanians' current knowledge, attitudes and actions related to land use.

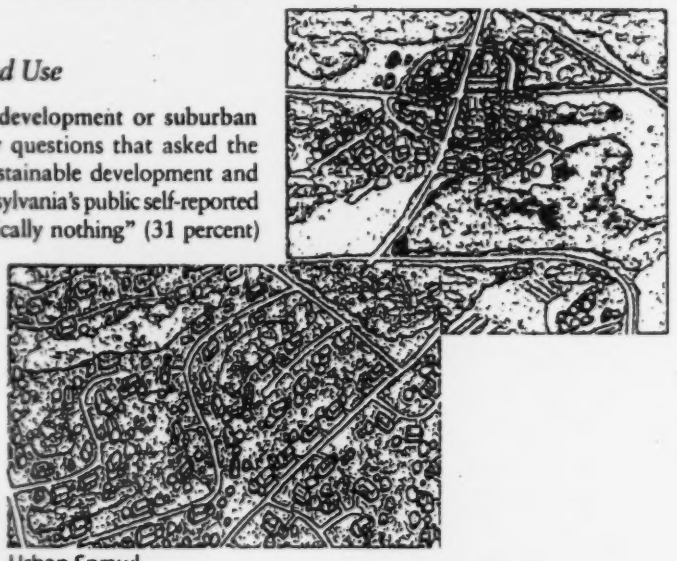
Environmental Literacy for Responsible Land Use

The public has little knowledge of sustainable development or suburban sprawl. This is documented by two separate survey questions that asked the respondent to self-report what they know about sustainable development and suburban sprawl. Sixty-five percent (65 percent) of Pennsylvania's public self-reported that they know "only a little" (34 percent) or "practically nothing" (31 percent) about sustainable development. The majority of the public (53 percent) also reported that they know "only a little" (31 percent) or "practically nothing" (22 percent) about suburban sprawl.

Attitudes Toward Private Property Rights vs. Environmental Impacts on Land

Not only at the state level, but also at the national level, the debate over private property rights of landowners and the environmental impact of land development has been raging.

Preferred Urban Design



Urban Sprawl

The public wants balanced consideration between private property rights and environmental impacts on land. In the Commonwealth, the most frequent response (40 percent) of Pennsylvanians was for balanced consideration between the two sides of the debate. Moderate favoritism for property rights (27 percent) and moderate favoritism for environmental protection (29 percent) also were balanced. Even the extreme responses on either side of this issue were fairly balanced with 11 percent of Pennsylvanians exclusively for private property rights and 9 percent exclusively for environmental protection. The northwest region is alone in its tendency toward favoring property rights over the environmental impacts to the land.

Intensity of suburban development in a geographic region and education level are related to an individual's attitudes toward the issue of private property rights. The western regions of Pennsylvania, as a whole, have less development pressures than the eastern regions of the state. Collectively, respondents in the eastern region favored consideration of the environmental impact of land development over private property rights. Respondents in the western regions favored considerations of private property rights over environmental impact concerns. Additionally, individuals who have higher levels of education tended to favor environmental impact concerns over private property rights.

Factors in Choosing a Place to Live in Pennsylvania

When choosing a place to live, the vast majority of Pennsylvanians want personal safety, green spaces such as parks and natural areas and quality schools. To a lesser degree, Pennsylvanians are influenced by property taxes and distance to work when choosing a place to live.

Of the five choices presented in this survey, all were chosen as important or very important by the majority of the state's respondents and these are all pieces of the suburban sprawl dilemma. Each of the five factors contributes to Pennsylvanians' residential land use behaviors. Appropriate residential land use plans for Pennsylvania must address, at minimum, these five factors.

Farmland Protection

Pennsylvania has a long history as an agricultural state. Farmland preservation is a common topic in land use discussions around the Commonwealth and must be a major component in sustainable development plans.

Residents of the Commonwealth want to protect farmland. As local municipalities continue to struggle with land use decisions, there will be little public resistance to preservation of farmland, as Pennsylvanians (88 percent) believe that farmland loss is occurring in the Commonwealth and that the acreage lost must be reduced. Four questions in the survey were dedicated to this issue. The findings reveal that the preferred action for farmland preservation is laws to protect the state's farmland (86 percent), followed by zoning ordinances (83 percent).

Transportation and Responsible Land Use

Transportation is one of many concerns associated with land use. The 21st Century Commission Report stated that "...transportation policy and infrastructure particularly reinforce sprawl." Transportation has been identified as one of the most serious environmental problems in the United States. Michael Brower and Warren Leon of the Union of Concerned Scientists have identified the seven most harmful consumer activities that affect air pollution, global warming, water pollution and habitat alteration[4]. Not surprisingly, the most harmful consumer activities included driving cars and light trucks.

Pennsylvanians' environmental attitudes and behaviors related to transportation are not currently contributing to sustainable and responsible land use. This conclusion was based on five separate questions included in the survey. Three of the five questions were knowledge-based questions, one was an attitude question and one related to individual behavior.

---

[4] Brower, M. and Leon, W. (1999). Consumer Guide to Effective Environmental Choices: Practical Advice from the Union of Concerned Scientists. Three Rivers Press, N.Y

The majority of Pennsylvanians (68 percent) understand the contribution of carbon monoxide to air pollution. Pennsylvanians (56 percent) also understand the role of atmospheric ozone. Additionally, they self-report (68 percent) that they have knowledge about air quality issues. Yet the majority of Pennsylvanians (61 percent) never use mass transit or car-pooling instead of driving, nor do they consider distance to work as among the highest priorities in their considerations when choosing a place to live. Further investigation of the statistics supporting this statement reveal an important association.

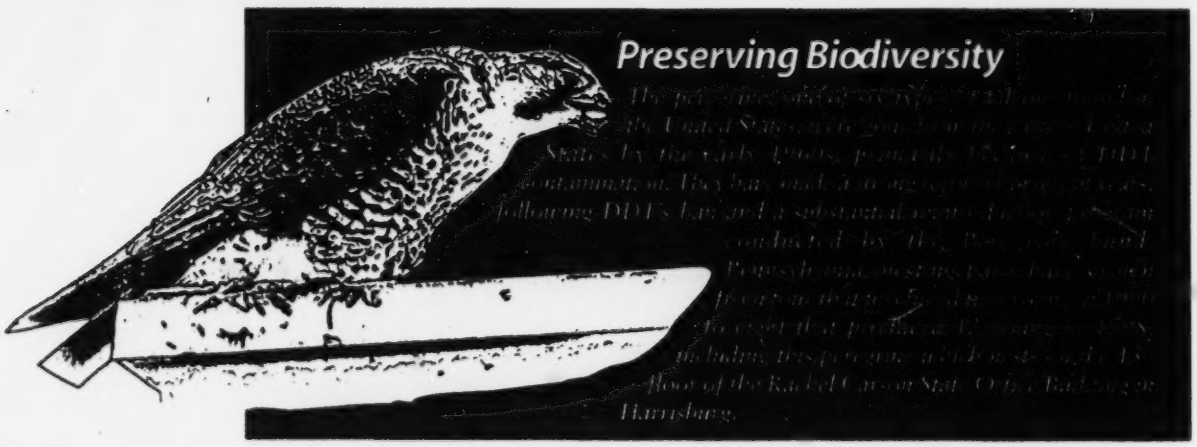
There is a significant association between where individuals live and their reported use of mass transit and car-pooling. The association is perfectly correlated with Pennsylvania population densities in relationship to "frequent" use of mass transit and car-pooling. Mass transportation or car-pooling is not easily accessible to all Pennsylvanians. Individuals in large cities have more access to mass transit and more opportunities for car-pooling; thus they use these alternatives to driving alone more frequently than individuals in less populated areas.

Based on this study, the educational contribution to solving the complex problem of transportation related to suburban sprawl is unclear. The study has revealed that the public is fairly knowledgeable about air pollution, yet they are not attitudinally or behaviorally prepared to contribute to solving environmental problems related to transportation and responsible land use. What is still not known is if the public is aware of the relationship between transportation and responsible land use or if they have knowledge and skills associated with providing solutions to this problem.

Conservation of Natural Resources for Sustainable Use

The *Report of the Pennsylvania 21st Century Environment Commission* stated, "Our natural resources today still support the state's strong sectors of agriculture, forestry and recreation/tourism and give it...one of the most diverse economies in the nation." The link between Pennsylvania's economy and environment is strong, making the conservation of natural resources for sustainable use particularly important to Pennsylvanians.

This study's findings reveal that Pennsylvania's public has some strong attitudes and positive behaviors toward conservation. It also was found that there are weak links in the public's knowledge of key conservation issues.



Natural Diversity Education

The commission stated that, "The diversity of life is a key measure of the health of our environment now and of its future reliability as a source of products and services for humans." Natural diversity is one common thread that binds economic, human and environmental health together.

The Pennsylvania public is not yet aware of the term biodiversity or the issues surrounding biodiversity. Biodiversity term recognition received low scores in both the literacy (38 percent) and perceived environmental issues knowledge sections (22 percent).

Concerning biodiversity, the public has not yet surpassed the earliest stage (awareness stage) in the educational process. While this is unsettling news, it should be kept in mind that the concept of biodiversity is relatively new, even to the scientific community. From an educational standpoint, this situation presents opportunities to provide model environmental education applications that can be held accountable and tracked throughout the educational process for effectiveness and efficiency.

Educating About Wetlands

Pennsylvania has lost nearly half of its wetlands. As a result, the *Report of the Pennsylvania 21st Century Environment Commission* called for a net gain in wetlands and the continued implementation of wetlands protection programs for new development.

About half (54 percent) of Pennsylvanians know about the benefits of wetlands. This figure is low, in itself, and is below the national average reported on the National Environmental Education Report Card.

A Healthy Environment for Healthy People

The commission understood the interrelationship of environment, economy and health and based many of its recommended actions on these interrelationships. Public acceptance and ultimate implementation of the commission's recommendations may be difficult if the public does not have the same understandings. Thus, numerous questions in this study looked at public perception of the variables of environment, economy and health.

Links Between Environmental Health and Human Health

Pennsylvanians (90 percent) clearly understand the link between environmental health and human health. Improving human and environmental health requires an understanding of how environmental conditions advance or degrade our fitness. This was one of the most conclusive findings of the study, with nine out of 10 respondents believing that this link is "strong" or "very strong."

Because the public is acutely aware, there is no need to increase educational efforts or provide an educational priority **at the awareness level** for understanding the link between environmental and human health. However, while there were knowledge and issues questions about air and water pollution, the public was not directly tested on its knowledge related to the links between environmental and human health.

Links Between Environmental Health and Economic Health

A little more than half of citizens of the Commonwealth (64 percent) believe that Pennsylvania's environment and economic development can go hand-in-hand. While the majority understands this interrelationship, this belief is not as frequently or as strongly held by the public as the relationship between environmental and human health. One out of four respondents (23 percent) believed that we must choose between the environment and the economy. Additionally, there is a pattern of greater support for the environment in eastern Pennsylvania and more support for the economy in western Pennsylvania.

While Pennsylvanians are progressing at the awareness level related to the interrelationship of environmental, economic and human health, the public has numerous specific educational needs at the knowledge level related to water and air issues. These include non-point source pollution, watershed management, and air pollution.

Pennsylvanians need to increase their environmental literacy (both knowledge and issues) on topics related to a healthy environment for healthy people. Priority educational applications are needed in the areas of non-point source pollution, watershed management and energy. Additionally, the public needs to increase its general knowledge of air and water pollution.

Historically, a regulatory approach was the predominant and, often, only way pollution problems were addressed. While a regulatory component is still necessary, particular attention should be given to an educational approach related to pollution, watershed management and energy. The application and enforcement of environmental laws and regulations may not produce the same high rate of environmental improvement for non-point source pollution concerns as it did for the point source of the last century. The title of "number one polluter" no longer goes to what has been typically perceived as corporate America. The focus has shifted to non-point source industrial polluters and the collective behavior of individual citizens.

Education will be one of the 21st Century tools of choice for addressing non-point source environmental problems. While pollution, energy and watershed management all have point of contact aspects to them, they are predominately dispersive in nature. Pollution caused by individual behaviors, agricultural run-off and acid mine seepage are more difficult to regulate than pollutants pouring out of a pipe. The commission stated, "We cannot coerce or regulate the individual behavior of 12 million people."

Non-point Source Pollution

The Pennsylvania 21st Century Environment Commission stated that "the most effective way to eliminate pollution is to prevent it from ever occurring." To efficiently and effectively prevent and eliminate pollution, one must know where primary sources of pollution have been occurring.

The public needs to be more involved in the entire environmental education process related to water issues in Pennsylvania. The public is only at the awareness level in the educational process and they have self-reported that their environmental learning is sporadic. Less than one in four (22 percent) of Pennsylvanians recognized non-point source pollution as the most common cause of water pollution in the state. Primary blame is still being placed on point source pollution, historically created by activities of "end of the pipe" types of business and industry. The public needs to understand that Pennsylvania mining, agriculture and the daily activities of individual citizens in their day-to-day activities now have a prominent role in water pollution prevention. Once their knowledge level has been raised, emphasis then needs to be placed in the areas of skill development and participation related to water issues in Pennsylvania.

Watershed Management

A sizable section of the *Report of the Pennsylvania 21st Century Environment Commission* was dedicated to the topic of watershed management. This is partially due to the fact that the dominant contributors to water pollution are now non-point in nature. Increases in the environmental health of waterways will require a more holistic and cooperative approach.

The commission believed that one of the solutions to water pollution problems is the development of a comprehensive watershed management plan. Community-based watershed management will be the principal method of improving water systems and ensuring adequate water supply. It further suggested that in order to encourage communities to initiate watershed management plans, government must be willing to be a partner, provide a workable regulatory framework, and supply information, technical assistance and funding.

The majority of Pennsylvanians do not understand the concept of watershed management. When the respondents were asked about their knowledge of watershed management issues, 61 percent stated that they knew "only a little" or "practically nothing." In order for a comprehensive watershed management plan to be effective, at minimum, the public must have a basic knowledge of the concept and understand why this approach is being recommended for Pennsylvania.

Air Pollution

The public needs to be more involved in the entire environmental education process for air pollution issues related to individual transportation choices. Pennsylvanians are further along in the educational process with air pollution than with non-point water pollution, but the individual citizen is not making significant attitudinal or behavioral contributions to solving air pollution problems associated with motor vehicles. At the attitudinal level, the public still primarily blames business and industry for pollution problems and does not view distance to work as a priority when choosing a place to live.

While the public has some basic knowledge about non-point source air pollution, citizens are not contributing, through their individual transportation behavior, to correcting air quality issues. Sixty-eight percent (68 percent) of the respondents in this study knew that motor vehicles are the biggest contributors to carbon monoxide levels in the atmosphere, yet Pennsylvanians are driving more than ever[5]. They also knew of the links between environmental and human health.

In the "What is Environmental Education" section of this report, it was stated that, "While information dissemination is an important part of this (educational) process, it, in itself, is not environmental education and can not be expected to produce significant or sustainable environmental stewardship." The findings that individuals have knowledge about their significant contribution to air pollution and have knowledge that poor air quality affects their health is a prime example of why the educational process cannot stop at the information level. Knowledge alone will not ensure environmentally responsible stewardship.

Solid Waste Reduction

Pennsylvanians are performing environmentally responsible behaviors related to solid waste reduction. A highlight of this study is the comprehensive information collected on recycling in Pennsylvania.

Pennsylvania's environmental education process for recycling has proven effective.

Act 101 (Recycling Act) requires Pennsylvania residents living in areas of concentrated populations to recycle. It is the law and Pennsylvanians are complying. Not only is it the law, but it is the only law in Pennsylvania that mandates and substantially funds an environmental educational component.

The public has some basic knowledge about solid waste, has positive attitudes toward recycling, is regularly participating in recycling programs, and is willing to voluntarily increase its recycling efforts. It is also frequently buying recycled products.

Pennsylvanians are exhibiting evidence of implementation along the entire environmental education process for recycling. For the majority of environmental challenges identified in the *Report of the Pennsylvania 21st Century Environment Commission*, Pennsylvanians are only at an awareness level or less (as with biodiversity and watershed management issues) or a knowledge level (as with transportation issues). The environmental education process includes awareness, knowledge, skills, attitudes and participation. Without all of these components environmental stewardship will not be achieved or sustained. Fortunately, recycling is being successfully implemented along the full range of the educational process.

Of all the knowledge questions asked of respondents (82 percent) in this survey, the Pennsylvania public most often knew the answer related to solid waste. While the law requires many individuals to develop skills associated with the physical act of recycling, the public's attitude toward this process is positive. They are not only willing to sustain this mandated behavior, but 94 percent of them are willing to enhance it by voluntarily supporting an increase of the state recycling goal from

[5]Pennsylvania Department of Environmental Protection, 1995.

25 percent to 35 percent. These collective traits of awareness, knowledge, skills, attitudes and participation span the length of the environmental education process and are characteristic of environmental stewardship.

Pennsylvanians' environmental stewardship related to recycling is likely a product of the implemented regulation/education model set forth in Act 101 (Recycling Act). Unfortunately, the contribution of education to environmental stewardship for recycling is not documented. Nor is there any other implemented regulation/education model in Pennsylvania to which these findings may be compared.

Pennsylvanians cannot visualize a zero waste stream. One point of concern is the level of solid waste reduction the public believes they can achieve. The *Report of the Pennsylvania 21st Century Environment Commission* suggested that in the next century Pennsylvanians will generate "...very little or no waste." The public does not believe that waste can be substantially or completely eliminated. When the respondents were asked how realistic they thought this suggestion was, three out of every four (77 percent) thought it was "unrealistic" or "very unrealistic."

Energy Resources

The public's knowledge of energy resources is weak. They (52 percent) believe that the major sources of electricity are coming from clean energy sources. There is also a substantial portion of the population that does not have a basic understanding of nuclear waste (47 percent) or the general concept of renewable vs. nonrenewable resources (36 percent). Knowledge is a contributing factor to behavior. Currently, Pennsylvanians have misinformation or lack information on a variety of energy related topics.

Developing a New Foundation for Teamwork

Change is a constant, as is the need to adjust to change. The Pennsylvania 21st Century Environment Commission, while lauding environmental progress to date, has suggested that future improvements in environmental, economic and human health will be a product of teamwork. The structure of the teams, their organization and the tools they choose to facilitate their missions may be different than those of the past. "The Commission's vision of the 21st Century is one of transformation, and one of the transformations we must achieve will change us from bystanders and consumers to active stewards of the environment."

This section provides a look at some historic environmental attitudes and then projects how they fit into the Pennsylvania 21st Century Environment Commission's vision for developing a new foundation for teamwork.

Pennsylvania Citizens' Disposition Toward Environmental Protection

Pennsylvanians have many positive and often balanced attitudes towards environmental protection. While it is not a guarantee, these positive environmental pre-dispositions favor cooperation of the public in environmental initiatives. Additionally, only a small portion of the public (20 percent) has extreme environmental attitudes on a wide variety of environmental issues. Most favor compromises and balanced approaches to addressing environmental problems

Public Perception of the Causes and Solutions to Environmental Problems

The public does not have the causes of pollution in perspective for Pennsylvania. Nearly three out of every four respondents (73 percent) still see factories and point source pollution as the primary cause of environmental degradation of the state's air and water. Contemporary non-point polluters

are now Pennsylvania's major contributors to water pollution, yet the public does not see themselves or agriculture as major contributors. This lack of perspective could interfere with non-point source pollution prevention and other cleanup initiatives.

Pennsylvania citizens see themselves as having the primary role in solving the Commonwealth's environmental problems. An enlightening finding in this study is the personal responsibility Pennsylvanians are willing to take to solve environmental problems. Other studies have found that individuals often expect other entities, such as government or business and industry, to take primary responsibility for correcting environmental problems. Individual positive attitudes toward the environment and the acknowledgement of personal responsibility for solving environmental problems is a good combination for initiatives targeting individual activity, as water quality monitoring, volunteerism, etc.

Public Attitudes Toward the Government's Role in Environmental Protection

The public does not feel overburdened by and wants to continue to rely on environmental laws and regulations as tools for environmental protection. More than three quarters of the respondents (76 percent) wanted more environmental laws and regulations or are satisfied with the number of laws and regulations that are currently in place. An example of this is the public's first choice of action in preserving farmland. When given the options of legislation, zoning and bonds to protect Pennsylvania farmlands, 86 percent favored legislation. They look favorably on government's future involvement in environmental protection.

While the public looks to the government to participate in solving environmental problems and they are supportive of continuing the use of environmental laws and regulations to protect the environment, the public believes individual citizens (82 percent), and then business and industry (79 percent), have a greater role than the government in solving environmental problems within the Commonwealth. This attitude favors new foundations for teamwork.

The public is monitoring environmental voting records of candidates for public office. Public officials have a key role in protecting Pennsylvania's environment. They represent their constituents and many of their constituents are looking at how they vote on environmental issues. Nearly three-quarters (73 percent) of the respondents either "frequently" or "sometimes" consider a candidate's record on protecting the environment when voting.

Promoting Environmental Education, Training and Stewardship

Pennsylvania's 21st Century Environment Commissioners have recognized and acknowledged environmental education as a tool for sustainable development in the next century. Environmental education, like education itself, is a process with numerous steps.

Historically, at a statewide level, environmental education has been applied sporadically and in disconnected and incomplete segments. For a multitude of reasons, educators typically have not been able to provide the complete environmental education process or conduct complete assessment studies.

Additionally, there has been a lack of both the understanding and the implementing of the environmental education process. Environmental education, like education itself, is a process with numerous steps. Too often, the extent of environmental education has been the distribution of "information." This is a disservice to the educational process and often squanders time and money. An environmental education process must include all of its components: awareness, knowledge, skills, attitudes and application.

The full contribution of environmental education to environmental protection and stewardship will be realized only when the entire environmental education process is applied and complete assessments can be conducted. An educational assessment should include 1) pre-assessing the intended audience to determine the parameters of the educational plan, 2) development of the plan based on the results of the pre-assessment, 3) applying the appropriate educational process, and 4) then assessing its effectiveness. This study, which was a recommendation of the *Report of the Pennsylvania 21st Century Environment Commission,* is an appropriate beginning to a complete assessment process.

Adult Environmental Learning

Adult environmental learning in Pennsylvania is sporadic and limited. Legislators, educators and others interested in addressing Pennsylvania's environmental challenges have much work ahead of them. Environmental awareness levels need to be raised for most of the identified environmental priorities in Pennsylvania's future. Additionally, Pennsylvania's adult knowledge base is weak for both environmental content and issues. When the public was asked if they try to learn about the environment or environmental issues, the most common response was "sometimes." This provides evidence as to the difficulty of educating an adult public. Finally, while the public appears to be willing stewards (attitudinally), they generally lack the skill and application levels for consistent and sustainable environmental stewardship.

Environmental education is a life-long process where environmental stewardship skills and applications change with changing needs to address specific environmental problems. "The public" is a vast and dispersed audience that admits to infrequently participating in the environmental learning process.

Environmental Education in Schools

Pennsylvanians want and need environmental education provided in schools. Citizens of the Commonwealth are extremely supportive of environmental education as part of the formal education system. This was the second strongest finding of the study, with a full 96 percent support. Due to the findings of the environmental literacy and issues section of this survey, there is clearly a need to increase environmental education in the state. This need coupled with the desire of the public to have environmental education in schools provides two critical components necessary for a broad-based and successful environmental education initiative within Pennsylvania.

Specific Educational Learning Needs

Specific educational (not just informational) efforts are needed within all of the environmental priorities identified in the *Report of the Pennsylvania 21st Century Environment Commission.* Pennsylvanians could not answer specific topic questions within each of the five priorities, stating that they know "very little" or "practically nothing" about these subjects. The public has a particularly poor understanding of the following topics:

- Transportation (as it relates to suburban sprawl and environmental health)
- Urban sprawl
- Non-point source pollution
- Biodiversity
- Energy
- Watershed management
- Sustainable development
- Agriculture

Business and Industry and Environmental Education

Business and industry have a vested role in environmental education. Aside from the obvious needs of the business and industry community to have environmentally astute employees, there are opportunities to participate in the environmental education process that will contribute to both identified public education needs and may improve public relations between the business and industry community and the public. Environmental education topics of direct relevance to business and industry include:

1) disbanding the misconception that "end of the pipe" pollution is currently the major source of pollution in Pennsylvania and contributing to public education on the major source of pollution, non-point source pollution;

2) support educational efforts to assist the public in understanding the relationship between environment and economy; and

3) participate in energy education.

Pennsylvanians as Self-evaluators of Their Environmental Learning

Pennsylvanians are able to fairly accurately assess their own environmental knowledge levels. It was found that an individual's level of self-reported knowledge was similar to that individual's actual knowledge about the environment. This means that when an individual said they knew about an environmental issue, they typically did. This determination was made by comparing the environmental knowledge questions in the literacy section of the survey with the self-reported environmental issue section of the study.

An Organized and Cooperative Approach to Environmental Literacy and Stewardship

There needs to be a continuation of an organized and cooperative approach to environmental literacy/stewardship for Pennsylvania citizens. The preeminent finding and its associated recommendation address this need. Environmental literacy concerns stem from the poor performance of Pennsylvania adults in both the knowledge and the perceived knowledge of environmental issues section of the survey. These sections provide evidence of shortcomings in a fundamental environmental knowledge base.

The responses in the perceived knowledge of environmental issues section also tell us that the public is aware of their own shortcomings. A public that does not have a grasp of environmental knowledge cannot effectively and efficiently participate in the higher order thinking skills that are required to solve Pennsylvania's environmental problems.

The survey identified numerous environmental topics in which the public needs environmental education assistance. These topics include: 1) transportation (as it relates to suburban sprawl and environmental health); 2) suburban sprawl; 3) non-point source pollution; 4) natural diversity; 5) energy; 6) watershed management; 7) sustainable development; and 8) agriculture. Public and private entities need to collaborate to raise environmental knowledge so it may contribute to the other components of the environmental education process, attitude formation, skill development and demonstration of stewardship.

No single agency or one organization can, nor should, be responsible for securing an environmentally literate populace for Pennsylvania. There clearly are lead agencies and organizations that have vested interests and are willing to accept the challenge of securing competency levels for specific environmental topics that contribute to environmental literacy and stewardship.

RECOMMENDATIONS

Pennsylvanians need to be stewards of their environment if they are to sustain the Commonwealth's environment, economy and human health. Many of these historic and national concerns are reflected in the Report of the Pennsylvania 21st Century Environment Commission, the state's guidebook for a sustainable future. The Commission recognizes the critical role of human behavior in securing a sustainable future. They also recognize education as the vital tool in solving environmental problems.

> ***"The Commission's vision of the 21st Century is one of transformation, and one of the transformations we must achieve will change us from bystanders and consumers to active stewards of the environment. Education is a vital tool of that transition, and environmental stewardship is the key instrument for converting our recommendations to reality."***
>
> ***Report of the Pennsylvania Century Environment Commission, September 1998***

Long Term Recommendation:

Pennsylvania's agencies, organizations, businesses and industries must continue to work collectively to increase the quality and quantity of environmental education in Pennsylvania, and strive towards environmental literacy and ultimately toward environmental stewardship. The environmental education process must be applied in its entirety and in a goal-driven and systematic method.

Short Term Recommendation:

A stakeholder group should be convened to suggest avenues to further strengthen the environmental education process, based on the findings of this report. The Pennsylvania Center for Environmental Education will be responsible for identifying a convener for the stakeholders group, determining stakeholder tasks and establishing a timeline for completion of the process.

Environmental Readiness for the 21st Century Survey Questions

APPENDIX 1

NOTE: In order to maintain the research integrity of this study, we respectfully request that these survey questions NOT BE distributed for widespread public consumption. Thank you.

Roper Starch Worldwide, Inc. Pennsylvania Environmental Study

1. To start, most of the time, do you think protecting Pennsylvania's environment and economic development in Pennsylvania can go hand in hand, or that we must choose between environmental protection and economic development?

   A. Can go hand in hand
   B. Must choose between the environment and the economy
   C. Depends

2. If we must choose between the environment and the economy, which do you believe is more important: economic development or environmental protection?

   A. Economic development
   B. Environmental protection
   C. Depends

3. There are differing opinions about how far we've gone with environmental protection laws and regulations. At the present time, do you think environmental protection laws and regulations have gone too far, or not far enough, or have struck about the right balance?

   A. Gone too far
   B. Not far enough
   C. Struck about right balance

4. Next, I would like you to indicate your level of support for either the private property rights of landowners or the environmental impacts of land development on a scale from 1 to 10, where 1 means you think that the private property rights of landowners are the only thing that matters, and 10 means that you think that the impact of land development on the environment is the only thing that matters

   Private Property Rights — Environmental Impact Concerns

   1 2 3 4 5 6 7 8 9 10

5. Now, I'd like to ask you for your opinion regarding responsibility for environmental problems in Pennsylvania. For each of the four groups I identify, I'd like you to indicate whether you strongly disagree, disagree, agree, or strongly agree with the statement I read about the group.

The major cause of environmental problems in Pennsylvania is because of the actions of:

	Strongly Disagree	Disagree	Agree	Strongly Agree	Don't Know
A. Business & Industry	☐	☐	☐	☐	☐
B. Government	☐	☐	☐	☐	☐
C. Individual Citizens	☐	☐	☐	☐	☐
D. Agriculture	☐	☐	☐	☐	☐

6. Now, I'd like to ask you for your opinion concerning who you think will contribute to solving environmental problems in Pennsylvania. For the same four groups, I 'd like you to indicate whether you strongly disagree, disagree, agree, or strongly agree with the statement I read about the group.

   The solution to environmental problems in Pennsylvania will depend on the actions of:

	Strongly Disagree	Disagree	Agree	Strongly Agree	Don't Know
A. Business & Industry	☐	☐	☐	☐	☐
B. Government	☐	☐	☐	☐	☐
C. Individual citizens	☐	☐	☐	☐	☐
D. Agriculture	☐	☐	☐	☐	☐

7. How much of an effect do you think the environment has on human health? Would you say,

	Strongly Disagree	Disagree	Agree	Strongly Agree	Don't Know
A. A very strong effect	☐	☐	☐	☐	☐
B. A strong effect	☐	☐	☐	☐	☐
C. A weak effect	☐	☐	☐	☐	☐
D. A very weak effect	☐	☐	☐	☐	☐

8. In general, how much do you feel you know about the following environmental issues? Do you think you know a lot, a fair amount, only a little, or practically nothing?

	A Lot	Fair Amount	Only A Little	Practically Nothing	Don't Know
A. Suburban sprawl	☐	☐	☐	☐	☐
B. Water pollution	☐	☐	☐	☐	☐
C. Air pollution	☐	☐	☐	☐	☐
D. Biodiversity	☐	☐	☐	☐	☐
E. Sustainable development	☐	☐	☐	☐	☐
F. Watershed management	☐	☐	☐	☐	☐
G. Natural resource conservation	☐	☐	☐	☐	☐

9. The next group of questions is about issues that have been covered in the media during the past two years or so. They are designed to tell us how much accurate information people are getting

from television, newspapers, magazines, and other sources. Each question has four possible answers. If you don't know the answer, you can just state that you don't know.

LISTED BELOW ARE THE TWELVE ENVIRONMENTAL LITERACY QUESTIONS.
PLEASE PLACE YOUR ANSWER IN THE BOX DISPLAYED TO
THE RIGHT OF EACH QUESTION.

10. 1 There are many different kinds of animals and plants, and they live in many different types of environments. What is the word used to describe this idea? Is it...

A. multiplicity

B. bio-diversity

C. socio-economics, or

D. evolution?

10. 2 Carbon monoxide is a major contributor to air pollution in the U.S. Which of the following is the biggest source of carbon monoxide? Is it...

A. factories and businesses

B. people breathing

C. motor vehicles, or

D. trees?

10. 3 How is most of the electricity in the U.S. generated? Is it...

A. by burning oil, coal, and wood

B. with nuclear power

C. through solar energy, or

D. at hydroelectric power plants?

10. 4 What is the most common cause of pollution of streams, rivers, and oceans? Is it...

A. dumping of garbage by cities

B. surface water running off yards, city streets, paved lots, and farm fields

C. trash washed into the ocean from beaches, or

D. waste dumped by factories?

10. 5 Which of the following is a renewable resource? Is it...

A. oil

B. iron ore

C. trees, or

D. coal?

10. 6 Ozone forms a protective layer in the Earth's upper atmosphere. What does ozone protect us from? Is it...

A. acid rain

B. global warming

C. sudden changes in temperature, or

D. harmful, cancer-causing sunlight?

10. 7 Where does most of the garbage in the U.S. end up? Is it in...

A. oceans
B. incinerators
C. recycling centers, or
D. landfills?

10.8 What is the name of the primary federal agency that works to protect the environment? Is it the...

A. Environmental Protection Agency (the EPA)
B. Department of Health, Environment, and Safety (the DHES)
C. National Environmental Agency (the NEA), or
D. Federal Pollution Control Agency (the FPCA)?

10.9 Which of the following household wastes is considered hazardous waste? Is it...

A. plastic packaging
B. glass
C. batteries, or
D. spoiled food?

10.10 What is the most common reason that an animal species becomes extinct? Is it because...

A. pesticides are killing them
B. their habitats are being destroyed by humans
C. there is too much hunting, or
D. there are climate changes that affect them?

10.11 Scientists have not determined the best solution for disposing of nuclear waste. In the U.S., what do we do with it now? Do we...

A. use it as nuclear fuel
B. sell it to other countries
C. dump it in landfills, or
D. store and monitor the waste?

10.12 What is the primary benefit of wetlands? Do they...

A. promote flooding
B. help clean the water before it enters lakes, streams, rivers, or oceans
C. keep the number of undesirable plants and animals low, or
D. provide good sites for landfills?

Now that you have completed the test, you can compare your answers to the correct answers listed below.

Answers to the Environmental Literacy Test:

10.1 ..... B	10.7 ..... D	
10.2 C	10.8 ..... A	100-90% ..... A
10.3 ..... A	10.9 C	90-80% ..... B
10.4 ..... B	10.10 ..... B	80-70% C
10.5 C	10.11 ..... D	70-60% ..... D
10.6 ..... D	10.12 ..... B	Below 60% .. F

To find your score, please take the total number of your correct answers and divide this by 12 (the total number of questions.) Example: 10 answers correct, divided by 12 gives you 83 percent - or grade B.

Your total divided by 12 X 100 = _____%

44

11. Now I 'd like to ask you some questions about some of the things you may do in your daily life. For each of the following actions, would you please tell me whether you never do it, sometimes do it, or frequently do it...

	Never	Sometimes	Frequently	Don't Know
A. Recycle things that can be recycled	☐	☐	☐	☐
B. Buy products in recycled or recyclable packaging	☐	☐	☐	☐
C. Use mass transit or carpooling instead of driving alone	☐	☐	☐	☐
D. Try to learn about the environment or environmental issues	☐	☐	☐	☐
E. Donate money to a group or organization working to protect the environment	☐	☐	☐	☐
F. Consider a candidate's record on protecting the environment when voting	☐	☐	☐	☐

12. The following questions are about environmental education for children in grades K through 12. Please answer each question with yes, no, or don't know.

	Never	Sometimes	Frequently	Don't Know
A. Do the schools in your community provide environmental education?	☐	☐	☐	☐
B. Do you think environmental education should be provided in schools?	☐	☐	☐	☐

13. It has been suggested that steps should be taken to protect Pennsylvania's farmland. Please indicate your level of agreement with this notion. Do you...

A. Strongly Disagree

B. Disagree

C. Agree, or

D. Strongly Agree

☐

14. I am going to read you some steps that might be taken to protect Pennsylvania's farmland. Would you strongly favor, favor, oppose, or strongly oppose it?

	Strongly Favor	Favor	Strongly Oppose	Oppose	Don't Know
A. A bond issue to protect farmland	☐	☐	☐	☐	☐
B. Changes in local zoning ordinances to protect farmland	☐	☐	☐	☐	☐
C. State laws designed to protect farmland	☐	☐	☐	☐	☐

15. How important are the following to you in deciding where you live? Is this a very important, important, unimportant, very unimportant characteristic?

	Very Important	Important	Very Unimportant	Unimportant	Don't Know
A. Quality of schools	☐	☐	☐	☐	☐
B. Personal safety	☐	☐	☐	☐	☐
C. Property taxes	☐	☐	☐	☐	☐
D. Distance to work	☐	☐	☐	☐	☐
E. Green spaces, such as parks and natural areas	☐	☐	☐	☐	☐

16. Pennsylvania's 21st Century Environment Commission has suggested that in the next century Pennsylvanians will generate "..very little or no waste." How realistic to you think this suggestion is...

A. Very unrealistic

B. Unrealistic

C. Realistic, or

D. Very realistic

17. The state would like to raise its recycling collection goal from 25 percent to 35 percent. How willing are you to increase your household recycling efforts to reach the 35 percent level? Would you say you are)...

A. Very willing

B. Willing

C. Unwilling, or

D. Very unwilling

Lastly, I have just a few questions for classification purposes.

D-1 Which of the following age categories includes your age?

A. 18 to 24

B. 25 to 44

C. 45 to 64

D. Over 65

E. Refused

D-2 Would you please stop me when I say the category that best describes the highest level of education you have completed, not counting specialized schools such as secretarial, art, or trade schools?

A. 8th grade or less

B. Some high school

C. High school graduate

D. Some college

E. Associate's degree

F. Bachelor's degree

G. Master's degree

H. Doctoral or other terminal degree
(J.D., M.D., Ed.D., Ph.D., etc.)

I. Refused

D-3 Would you describe the area you live in as a:

A. Large city

B. Medium city

C. Small city

D. Suburban town

E. Small town

F. Rural or farm area

D-4 Do you own land in Pennsylvania?

A. Yes

B. No

C. Refused

D-5 For statistical purposes only, we need to know your total household income. I'm going to read some income categories. Would you please stop me when I say the category that best describes the total annual income of this household, including wages or salary, interest, and all other sources?

A. Under $10,000

B. $10,001 to $25,000

C. $25,001 to $50,000

D. $50,001 to $75,000

E. Above $75,000

F. Refused/Don't know

Methodology

APPENDIX 2

The First Pennsylvania Environmental Readiness for the 21st Century Survey Report consisted of a series of questions that were asked to a random sample of 1,000 adult Pennsylvanians in a 15-minute telephone survey. The survey instrument was developed from the 1997 National Environmental Education Report Card and then adapted to meet Pennsylvania's specific needs. The Report of the Pennsylvania 21st Century Environment Commission was the lead document in the Pennsylvania specific adaptation.

A work group was initiated to oversee the project. The work group consisted of representatives from Pennsylvania's 21st Century Environment Commission, National Environmental Education and Training Foundation, Pennsylvania Business Roundtable, Department of Environmental Protection, Pennsylvania Fish and Boat Commission, the North American Association for Environmental Education and the Pennsylvania Center for Environmental Education.

Once the survey instrument was developed, it was distributed to a variety of reviewers outside of the initial work group (see acknowledgements for details). The survey instrument was pre-tested for reliability by the co-investigators.

Roper Starch Worldwide was contracted to conduct the telephone survey. They also pretested the survey instrument. The general random digit-dial survey was stratified to include adequate representation by six regions for Pennsylvania. This allowed for regional analysis. Roper provided raw data and frequency statistics for each question, plus targets to bring the completed interviews into their proper proportion.

Statistical analysis was provided by Dr. Nicholas Smith-Sebasto of the University of Illinois at Urbana-Champaign and then reviewed by David Lintern, Senior Project Director at Roper. Dr. Smith-Sebasto also represented the Research Commission of the North American Association for Environmental Education and provided his expertise on study design and interpretation.

Pennsylvania by Regions

APPENDIX 3

BEST COPY AVAILABLE

This and related environmental information are available electronically via the Internet. For more information visit us through the PA PowerPort at http://www.state.pa.us or visit the DEP directly at http://www.dep.state.pa.us.

www.GreenWorks.tv - A web space dedicated to helping you learn how to protect and improve the environment. The site features the largest collection of environmental videos available on the Internet and is produced by the nonprofit Environmental Fund for Pennsylvania, with financial support from the Pennsylvania Department of Environmental Protection, 877-PA-GREEN.

Printed with soy inks on recycled paper made from 100% post consumer waste fiber that is process chlorine free